REPORTS on the MARINE BIOLOGY of the SUDANESE RED SEA, from Collections made by CYRIL CROSSLAND, M.A., B.Sc., F.Z.S.; together with Collections made in the Red Sea by Dr. R. HARTMEYER.—XII. The BRYOZOA. By ARTHUR WM. WATERS, F.L.S.

PART I.—CHEILOSTOMATA.

(PLATES 10–18.)

[Read 18th June, 1908.]

THIS collection has to be considered from more than one standpoint, and after the general one of learning more about the Fauna of the Red Sea we naturally turn to any work already done and recognise how much the usefulness of the splendid plates prepared by Savigny will be increased when the fauna of the Red Sea has been adequately compared. After the failure of Savigny's health, names were given by Audouin to the figures drawn by Savigny, but no description has been published; however, many of the figures have been recognised as species occurring from other localities, but concerning some there has been uncertainty. According to enquiries made in Paris none of Savigny's collection is now in existence.

The collection made by Mr. Crossland by no means fully represents the fauna, for of this there can be no doubt when such genera as *Retepora*, *Cellaria*, *Flustra*, *Hornera*, *Alcyonidium*, *Cribrilina*, &c. are unrepresented.

The Berlin Kgl. Zoologisches Museum kindly lent me a collection from the Red Sea, made by Dr. R. Hartmeyer, together with a few species collected by Messrs. Löffler and Siemens, and forms not found in the Crossland collection are described at the end of this communication; also a list of other species now known from the Red Sea is given on page 128.

Next comes the question of the distribution of Red Sea and other tropical faunas, which have so far not received as much attention as those of temperate and Arctic faunas, for until recently it was considered that the tropical Bryozoa fauna was very meagre. Having also had intrusted to me Mr. Crossland's large and important collections from Zanzibar, as well as one made by him off Cape Verde Islands, I am considering the series as practically a study of all known tropical forms*.

Some recent papers, among others those of Kirkpatrick, Philipps, and Thornely, have prepared us for finding a very wide geographical distribution of tropical forms; but notwithstanding this, after looking through practically all the British Museum specimens, which now include Busk's and Hincks's collections, examining my own collections and those upon which I am at work, there is constantly a feeling of surprise when finding species from such wide areas. This is perhaps somewhat intensified in my case, through my last work having dealt with Arctic and Antarctic Bryozoa, where the faunas are so much more distinct. The analysis of the distribution is postponed for the paper on the Cyclostomata, &c.

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* At present, besides the collections mentioned, the 'Siboga' and Stanley Gardiner 'Sealark' collections are in the hands of specialists, and therefore a knowledge of the Red Sea fauna, connecting the Atlantic and East, is of great importance.

Specimens from near the Suez Canal, where we find so many Mediterranean species, cannot be considered as reliable as those from farther down the Red Sea, for passing ships may have brought some from distant parts, and ultimately a list of species exclusive of those from Suez would be interesting. This question of artificial transport is not confined to the Red Sea, but nowhere should we be more alive to it. However, regarding this, Mr. Crossland writes "*re* Suez forms, my examination of ships' bottoms there suggests that very few forms survive the Canal. There was a very marked difference between Red Sea steamers and those brought through from Alexandria, the former being very rich."

Points of Special Interest.

Attention must be called, in the first place, to the very wide distribution of so many species of tropical Bryozoa (see page 126); in the next, to the great variety of form and development of the oral glands, as well as their similarity in certain groups, consequently their importance in classification is explained (p. 154). It is shown that there is a group, now separated from *Cellepora* as *Holoporella*, the zoœcia of which have a widely open ovicell, an operculum with a nearly straight and entire proximal edge, many of the avicularian mandibles have a collumella; also at the side of the zoœcium there are, in most species, minute avicularia which have been overlooked; and the zoœcia have large tubular oral glands (p. 159).

Reference is again made to *Thalamoporella* having two or three larvæ in the ovicell; also the pigment of species of *Holoporella* is mentioned and the growth of the new buds from the operculum (pp. 163, 164). I allude to the number of characters which influence the structure of the operculum, and it is now easier to understand why it is of so much use in classification (p. 161).

I cannot close this introduction without expressing my thanks to Mr. Kirkpatrick for the kind way in which he has allowed me to make frequent references to the British Museum collections, and also to Miss Thornely for assistance in examining the Manaar collections.

The literature specially dealing with the tropical forms is not large and the following are the principal works :—

Savigny, J. C.—Description de l'Egypte. Hist. nat. i. pls. 6–14.

Audouin, J. V.—Explication sommaire des Planches de Polypes de l'Egypte et de la Syrie, pub. par J. C. Savigny. 1826.*

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* C. D. Sherborn, "On the Dates of the Natural History Portion of Sav. Descr. de l'Egypte," Proc. Zool. Soc. 1897, p. 285.

HASWELL, W. A.—“On some Polyzoa from the Queensland Coast.” Proc. Linn. Soc. New South Wales, vol. v. p. 33–44. 1881.

HINCKS, T.—“Polyzoa from India.” Ann. Mag. Nat. Hist. ser. 5, vol. xiii. p. 356. 1884.

BUSK, G.—Report on Voyage of H.M.S. ‘Challenger,’ vol. x. pt. xxx. Cheilostomata, 1884; do. Cyclostomata, &c. 1886.

HINCKS, T.—“Polyzoa and Hydroida of the Mergui Archipelago.” Journ. Linn. Soc., Zool. vol. xxi. pp. 121–135, pl. 12. 1887.

KIRKPATRICK, R.—“Polyzoa of Mauritius.” Ann. Mag. Nat. Hist. ser. 6, vol. i. p. 72. 1888.

KIRKPATRICK, R.—“Hydrozoa and Polyzoa .... in the China Sea.” Ann. Mag. Nat. Hist. ser. 6, vol. v. 1890.

KIRKPATRICK, R.—“Hydroida and Polyzoa (Torres Straits).” Proc. Roy. Dublin Soc. n. s. vol. vi. 1890.

PHILIPPS, E. G.—“Report on Polyzoa collected by Dr. Willey.” Willey's Zool. Results, pt. iv. p. 439. 1899.

THORNELY, L. R.—“On the Polyzoa.” Herdman, Rep. on Pearl Oyster Fisheries of the Gulf of Manaar. This is shortly referred to in this paper as “Manaar.” 1905.

THORNELY, L. R.—“Rep. on the Marine Polyzoa.” Rec. of the Indian Museum, vol. i. pt. 3, no. 13. 1907.

With regard to Savigny's figures, there is no description. However, the Zoological Congress has decided that to obtain priority the species must have been CLEARLY AND SUFFICIENTLY DESCRIBED; but figures alone have been accepted as sufficient, and an example somewhat similar to that of Savigny's is given of Du Clos publishing figures of *Columbella*, and his names being accepted, although there was no textual description.

If we take such a case as *Catenaria Lafontii*, Aud., where the figure makes it as easy to recognise the species as if a slide had been attached, then with such a figure before us any doubt as to our knowing the species, or suggesting another name, would be simply pedantry.

Unfortunately, matters are not always so simple, and the rule just mentioned, which in one form or another occurs in all papers on nomenclature, is frequently forgotten by those who are urging the revival of old names of imperfectly described genera and species.

I have, as in previous papers, retained established generic names, even when recognising that changes in classification will shortly have to be made.

As in all my recent papers, I give the number of tentacles where there has been satisfactory material to cut. This is not likely to be one of the most useful characters in classification, but it certainly is a character which should be recorded; and we are now seeing that in many genera there is always approximately the same number, so that a great variation from the normal

Collected by Crossland.

Page		Cape Verde I.	Atlantic.	British Isles.	Mediterranean.	Red Sea, Cross.	Red Sea, Hart.	Indian Ocean.	Ceylon.	Zanzibar.	Japan.	Australasian.	Fossil.	
129	*Ætea recta*, Hincks	...	+	+	+	+	...	+	+	...	...	+	+	
129	*Synnotum aviculare*, Pieper	...	...	...	+	+	+	+	...	+	...	+	...	S. Africa, Fernando Noronha.
130	*Vittaticella Contei*, Aud.	...	...	...	+	+								
131	*Catenaria Lafontii*, Aud.	...	+	...	+	+	...	+	+	+				
132	*Scrupocellaria Jolloisii*, Aud.	...	...	...	...	+	+							
133	,, *Bertholletti*, Aud.	+	+	...	+	+								
133	,, *serrata*, nov.	...	...	...	...	+								
134	,, *mansueta*, nov.	...	...	...	...	+	+							
134	,, *scrupea*, var. *dongolensis*, nov.	...	...	...	+	+	...	...	+					
135	*Bicellaria ciliata*, L.	...	...	+	+	+	...	...	...	...	...	+	...	S. Africa.
135	*Bugula avicularia*, L.	...	...	+	+	+	...	...	...	...	...	+	...	Lifu.
135	,, *neritina*, L.	...	+B.	+	+	+	...	+	+	+	+	+		
136	,, ,, var. *minima*, nov.	...	...	...	...	+	...	...	...	+	...	+		
137	*Beania intermedia*, Hincks	...	...	...	...	+	...	+	...	...	...	+	...	Chatham I.
137	*Membranipora Savartii*, Aud.	...	+	...	...	+	+	+	+	+	...	+	+	
139	,, *bursaria*, MacG.	...	...	...	...	+	...	...	+	...	...	+		
140	,, *limosa*, nov.	...	...	...	...	+								
141	*Thalamoporella Rozieri*, Aud.	+	+	+	+	+	+	+	+	...	...	+	+	California.
142	*Tubucellaria cereoides*, Pall.	+	+	...	+	+	...	+	+	+	...	+	+	
142	*Microporella coronata*, Aud.	...	...	...	...	+	+	...	...	...	+W.	+	...	California.
143	,, *ciliata*, Pall.	...	+	+	+	+	+	+	+	...	...	+	+	
143	*Schizoporella unicornis*, Johnst.	+	+	+	+	+	...	...	+	+	+	...	+	
144	,, ,, var.	...	+	...	+	+	...	...	...	...	...	...	+	
145	,, ,, var. *ansata*, Johnst.	...	+	+	+	+	...	...	...	...	...	...	+	
146	,, *argentea*, Hincks	...	...	...	...	+	...	...	+	...	...	...	...	Tahiti, S. Africa.
147	,, *viridis*, Thorn.	...	...	...	+	+	...	...	+					
149	*Lepralia japonica*, Busk	...	...	...	...	+	...	...	+	+	+	...	...	Mauritius, Trincomalee.
150	,, *cucullata*, Busk	+	+	...	+	+	+	+	+	...	...	...	+	California, S. Africa.
152	,, *robusta*, Hincks	...	...	...	...	+	...	...	+	...	...	...	...	Mergui.
152	,, *occlusa*, Busk	...	...	...	...	+	...	...	...	+	...	+	...	Crozet Is.
156	*Smittia spathulata*, MacG.	...	...	...	...	+	+	...	+	...	...	+		
157	,, *marmorea*, Hincks	...	+	+	+	+	...	...	...	...	...	...	+	
157	,, *egyptiaca*, nov.													
158	,, ,, var. *heroopolita*,	...	...	...	...	+	+							
	nov.	...	...	...	...	+								
158	*Rhynchozoon corrugatum*, Thorn.	...	...	...	...	+	...	...	+					
159	*Lagenipora Costazii*, Aud., var. *spathulata*, MacG.	...	...	...	...	+	...	...	...	...	...	+		
161	*Holoporella aperta*, Hincks	...	+	...	...	+	+	+	+	+	...	...	...	Cuba.
162	,, *Decostilsii*, Aud.	...	...	...	...	+	+							
163	,, *pigmentaria*, nov.	...	...	...	...	+	+							
164	,, *vermiformis*, nov.	...	...	...	...	+								

Collected by Hartmeyer, Siemens & Löffler.

Page		Cape Verde I.	Atlantic.	British Isles.	Mediterranean.	Red Sea, Cross.	Red Sea, Hart.	Indian Ocean.	Ceylon.	Zanzibar.	Japan.	Australasian.	Fossil.
165	*Canda arachnoides*, Lamx. (1)	...	...	...	...	...	+	...	...	...	+w.	+	
166	*Scrupocellaria cervicornis*, Busk	...	+	...	...	...	+	+	+	+	...	+	
166	*Membranipora trifolium*, var. *minor*, Hincks	...	+s.	...	...	...	+	...	...	...	...	+	+
167	„ *Aragoi*, Aud.	...	...	...	...	...	+						
167	*Farcimia oculata*, Busk	...	+	...	...	...	+	+	+	+	...	+	+
168	*Chaperia tropica*, sp. nov.	...	...	...	...	...	+						
168	*Microporella Malusii*, Aud. (2)	...	+	+	+	...	+	+	...	...	...	+	+
168	*Schizoporella nivea*, Busk (3)	...	...	...	...	...	+	+	+	+	...	+	
169	„ *mucronata*, Sm.	...	+	...	...	...	+	...	...	...	...	+	
169	„ *pes anseris*, Sm. (4)	...	+	...	...	...	+	...	+				
169	„ *Bernardii*, Aud. (5)	...	...	...	...	...	+	...	+				
170	*Gigantopora fenestrata*, Sm. (6)	+	+	...	...	...	+	...	+	...	...	...	+
171	*Lepralia Montferrandi*, Aud.	...	...	...	...	...	+	+	+	...	+		
171	„ *lonchæa*, Busk	...	...	...	...	...	+	...	...	...	...	+	
172	„ sp.												
172	*Lagenipora ? tuberculata*, MacG.	...	...	...	...	...	+	...	...	...	...	+	
173	*Smittia nitida*, Verrill	...	+	...	...	...	+						
173	„ *trispinosa*, var. *protecta*, Thorn.	...	...	...	...	...	+	...	+				
174	„ *tropica*, sp. nov.	...	...	...	...	...	+						
174	*Lagenipora Costazii*, Aud.	...	+	+	+	...	+	...	...	...	...	...	+
175	*Retepora hirsuta*, Busk	...	...	...	...	...	+	...	...	...	...	+	
176	„ *abyssinica*, nov.	...	...	...	...	...	+						
176	„ *jermanensis*, nov.	...	...	...	...	...	+						

OTHER LOCALITIES :—

(1) Timor.

(2) Tahiti, S. America, S. Africa. Fossil: Tert., Europe, Australia, Patagonia.

(3) S. Africa.

(4) Mauritius.

(5) Lifu.

(6) S. Africa, Mauritius, Brazil.

Known in the Red Sea from other Collections.

	Cape Verde I.	Atlantic.	British Isles.	Mediterranean.	Red Sea.	Indian Ocean.	Ceylon.	Zanzibar.	Japan.	Australia.	Fossil.	
(2) *Membranipora bellula*, Hincks	+	...	...	...	+	...	...	...	...	+	...	Madagascar.
(1) *Micropora coriacea*, Esper	...	+	+	+	+	...	...	...	...	...	+	Mauritius.
(2) *Thairopora mamillaris*, Lamx.	...	...	...	...	+A.	W. co	ll.	+	...	+		
(1) *Microporella impressa*, Aud.	...	...	+	+	+							
(1) „ *personata*, Busk	...	...	...	...	+	+	...	...	+	...	...	Falkland I.
Cribrilina radiata, Moll.	...	+	+	+	+	+	...	+	...	+	+	Tahiti, Singapore or Philippines.
(1) „ *Gattyæ*, Busk	...	...	+	+	+							
Schizoporella Dutertrei, Aud.	...	+	+	...	+	...	...	...	...	...	+	
(4) „ *Leperei*, Aud.	...	...	...	...	+							
(1) *Schizotheca serratimargo*, Hincks	...	...	...	+	+	...	...	...	...	...	+	Suez.
(1) *Lepralia Pallasiana*, Moll.	...	+	+	+	+	...	...	...	...	...	+	
(3) „ *quadrata*, MacG.	...	...	...	...	+	+ (1)	...	...	...	+	+	Tizard Reef.
(4) „ *Marceli*, Aud.	...	...	...	...	+							
(1) *Smittia ophidiana*, Waters	...	...	...	+	+	...	...	...	...	...	+	
(1) *Retepora fissilabris*, Busk, MSS.	...	...	...	...	+							
(5) „ ? *prætenuis*, Hincks	...	...	...	...	+							
(5) „ ? *plana*, Hincks	...	...	...	...	+							
(5) „ *cellulosa*, Hincks	...	+	...	...	+	...	...	...	...	...	+	
Holoporella pertusa, Sm.	...	...	...	...	+A.	W. co	ll.					

(1) British Museum.

(2) This was taken from a sounding-line on a passenger ship in the Red Sea. There is the off-chance that it may have adhered to the line from other soundings.

(3) Named *robusta* in Brit. Mus.

(4) Audouin, 'Description de l'Égypte.'

(5) Hincks, Ann. Mag. Nat. Hist. ser. 5, i. (1878) p. 356–364.

should cause us to carefully examine other characters to make sure that our classification is correct. Unless the material is very limited or difficult to cut, the tentacles of many zoœcia can be counted.

In some cases, such as the Cyclostomata, most Ctenostomata and a few Cheilostomata, where the number of tentacles is small, namely 8–12, large pieces may be examined without finding any variation, whereas where there are more tentacles then there is a greater range; but even then there is one number which is far the most abundant, and from this there may be a variation of one or two on each side, but never a large range. I usually say about so many, and it must be understood that absolute uniformity is not usually intended. I have the figures of a large number of species besides those published, and hope to discuss the results.

Jullien and Calvet's terms 'anter' and 'poster' are now adopted. Jullien & Calvet, 'Bry. prov. de l'Hirondelle,' p. 17, 1903, divide the aperture into 'anter' and 'poster,' and the operculum into 'porta' and 'vanna.' The anter is the distal part of the aperture and is closed by the porta; and the poster is the proximal part and is closed by the vanna. The division is made by an imaginary line between the two points at which the operculum is hinged. According to Jullien the vanna closes the opening of the compensation sac, but for his explanation and the function of the two parts the reader is referred to the work mentioned.

ÆTEA RECTA, *Hincks.*

Ætea recta, Hincks, Ann. Mag. Nat. Hist. ser. 3, vol. ix. p. 25, pl. 7*. fig. 3; Waters, "Chatham Island, &c.," *op. cit.* ser. 7, vol. xvii. p. 12, pl. 1. fig. 13. For other synonyms see Miss Jelly's Catalogue.

This is probably the most widely distributed species of *Ætea* and has often been mentioned under other names. The specimens in this collection are small and do not permit of further study. This is the species in which the ovicells are known *.

Loc. Khor Shinab (3), Khor Dongola (2) (19).

SYNNOTUM AVICULARE (*Pieper*).

Gemellaria avicularis, Pieper, Jahresbericht Westfälischen Provincialvereins, vol. ix. p. 43, pl. 2. figs. 5–9 (1880).

Notamia avicularis, Waters, "On the Use of the Avicularian Mandible, &c.," Journ. R. Micro. Soc. ser. 2, vol. v. p. 6 (1885).

Synnotum aviculare, Hincks, Ann. Mag. Nat. Hist. ser. 5, vol. xvii. (1886) p. 257; Kirkpatrick, "Zool. of Fernando Noronha," Journ. Linn. Soc., Zool. vol. xx. (1888) p. 504; Waters, Journ. Linn. Soc., Zool. vol. xxvi. (1896) p. 14, pl. 1. figs. 6, 7; ? Robertson, "Non-incrusting Chil. Bry.," University of California, Zool. vol. ii. no. 5, p. 286, pl. 14. figs. 84, 85 (1905); Thornely, Rec. Indian Mus. vol. i. pt. 3, no. 13, p. 183 (1907).

? *Gemellaria ægyptiaca,* Savigny (name on plate), pl. 13. fig. 4, but *Loricaria ægyptiaca,* Audouin, "Descrip. de l'Égypte," in text, p. 234.

Loc. Although this has for the most part only been seen in small fragments, its distribution is extremely wide, as it has been found from Naples, Rapallo, Trieste, Andamans (*Th.*), Tizard Island, Portland and Port Phillip (Victoria), S. Africa, Fernando Noronha, California (?). Khor Shinab, 10–12 fath. (3), Nersa Mukdah (12), Khor Dongola (19), collected by Crossland; lat. 15° N., long. 41° W., 18 fath., collected by Löffler & Siemens; Ras el Millan, collected by Hartmeyer. The specimens so named from California are somewhat larger, and from Zanzibar there is a larger form which I believe to be a new species.

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* Waters, Journ. Linn. Soc., Zool. vol. xxvi. (1896) p. 5.

VITTATICELLA CONTEI (*Audouin*). (Plate **10**. figs. 1–4.)

Eucratea Contei, Audouin, "Descr. de l'Égypte," Hist. nat. p. 242; Savigny, on plate 13. fig. 1, calls it "Catenaires"*.

Catenicella Savignyi, Blainville, Man. d'Actinologie, p. 462, pl. 78. fig. 5 (1834).

Catenicella Contei, d'Orb. Pal. Franç. vol. v. p. 44 (1850).

The zoarium has usually one or two single globulæ, and then a geminate one, and a new branch may also occasionally grow with a corneous connection from the anterior surface of a globula. There are radicles from the dorsal surface, though frequently radicle chambers exist without the radicles being developed. Neither the growing stolons nor the earliest zoœcia have been found. Zoœcia elongate, contracting to the base, with a narrow vitta on each side; a spinous process, varying considerably in length, at each upper corner; but apparently without avicularia, and in stained preparations these processes were found to be empty.

The oral aperture is nearly round, but rather flattened on the proximal edge; the operculum is smaller than in any other species of *Catenicellidæ* which I have examined, and the muscular attachments are at the side. The compensation sac is very short.

There are 12 tentacles. According to Maplestone there are also 12 tentacles in *C. lorica*, Busk, and *C. ventricosa*, Busk. The ovicells are unknown.

The species was first figured by Savigny, who placed it in his genus *Catenaria*, which apparently included this and *Alysidium Lafontii* (Aud.), but Audouin in his description called them both *Eucratea*; next Blainville modified the name *Catenaria* to *Catenicella*, for which verbal change there was no justification, and *Contei* was the type which he again figured, but his genus included *Hippothoa divaricata*, from which part of his generic description was written, in fact he says perhaps *Contei* is the same as *H. divaricata*, Lamx. It will thus be seen that the genus *Catenicella* should never have been made, and that it is a synonym of *Catenaria*; nor was Blainville justified in changing the specific name and calling the species *Savignyi*. Several of Audouin's species were similarly re-named by d'Orbigny.

For this division of the *Catenicellidæ* MacGillivray has made a new genus *Caloporella* *, afterwards changed to *Vittaticella*, thus unfortunately removing the type of *Catenaria*—or, as generally known, *Catenicella*—from the genus *Catenicella*. However, it would now cause great confusion to change the name of *Catenicella*, especially as *Catenaria* has been differently defined.

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* It may be well to call attention to the fact that Savigny always used the plural form of the generic name on his plates, even when there was only one species. On the present plate (13) there are the names of three genera, while there are only four species, so that we can only presume which species Savigny meant to join together, and apparently Audouin was in the same position as we are. Audouin placed the first three species in one genus, but now they are put in three.

Loc. Mediterranean (*Blainville*) ; Red Sea and Java (*d'Orbigny*). Among coral from a reef, Khor Dongola (19) ; and Nersa Makdah, 5 fath. (12), collected by Crossland.

CATENARIA LAFONTII (*Audouin & Savigny*).

For synonyms see Miss Jelly's Catalogue under *Eucratea Lafontii*, and add :—

Catenaria Lafontii, Harmer, "Morph. Cheil.," Q. Journ. Micr. Sc. vol. xlvi. (1902) p. 305, pl. 17. fig. 49; Thornely, "Manaar," p. 108 (1905); id. Records of Indian Museum, vol. i. p. 3, no. 13 (1907) p. 180.

Eucratea Lafontii, Calvet, "Bry. Mar. de Cette," Tr. Inst. de Zool. de l'Univ. de Montpellier, 2nd ser. Mém. 11, p. 13 (1902); "Bry. Mar. de Corse," *op. cit.* Mém. 12, p. 6 (1902).

It is very difficult to decide what the generic name should be, as one author after another has made a series of mistakes about the genus.

It was figured by Savigny, and the generic name on the plate was presumably *Catenaires*, as we must certainly conclude that it was meant to refer to *C. Contei*, Aud., and *C. Lafontii*; but *C. Contei* was figure 1, and therefore should be the type. Now this is typical *Catenicellidæ*, though for this species (*Contei*) Blainville modified the name to *Catenicella*, which according to our present ideas was quite unallowable, and what we now call *Catenicella* should have been *Catenaria*. In the text Audouin placed *Lafontii* under *Eucratea*, and this seemed right at the time, but as the branching is very different, and the ovicells do not at all correspond, it now seems advisable to retain the two genera.

Then Busk made a new genus *Alysidium* for it, but later in the 'Challenger' Report he took *Lafontii* as the type of *Catenaria*, though, as we have seen, *Contei* should have been the type. D'Orbigny had, however, described the genus *Catenaria*, so that if it is retained it is *Catenaria* of d'Orbigny ; we have here, however, the difficulty that he placed in it *C. Lafontii*, *C. chelata*, Lamx., and *C. ambigua*, d'Orb., whereas he ought to have retained *Eucratea* if *chelata* is included.

Busk described several new species as *Catenaria*, and Harmer and Thornely have followed him in placing *Lafontii* under *Catenaria* ; and though it certainly never ought to have been placed under *Catenaria* it seems to be best to leave it here.

The ovicell of *Catenaria diaphana*, Busk, is somewhat similar and the thrown-back open ovicell must be considered as a generic character.

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* The name was subsequently changed by MacGillivray, as there was already a genus *Calloporella*, see Proc. Roy. Soc. Vict. n. s. vol. xiii. p. 210 (1901).

There are about 15–17 tentacles, and the ovicell is not closed by the operculum.

Although there is a considerable amount of material, it has not been possible to find the stolon from which it grows, or the younger zoœcia, and it had all evidently been torn away from the surface on which it grew. As I have already stated, *Alysidium parasiticum*, Busk, is rooted by corneous tubes, which sometimes have calcareous nodes from which the stalk of the sub-colony grows, but I consider that *A. parasiticum* must be placed under *Eucratea*.

The North Italian fossil *Unicrisia tenerrima*, Reuss, belongs to the genus *Catenaria* *.

Loc. Adriatic; Naples; Capri; Rapallo; Cette, 70–80 met. (*Calv.*); Corsica, 35 met.: Maderia; Manaar (*Th.*); Andamans (*Th.*). Khor Shinab, 10–12 fath. (3); from Mediterranean ship docked in Suez (9); Nersa Makdah (12); Floating Stage, Suez (15), Khor Dongola (19), Suakim; Wasin, Brit. E. Africa, 10 fath. (501); Ras Osowamembe, Zanzibar Channel, 10 fath. (504); Prison Island, Zanzibar, 8 fath. (505); Chuaka, Zanzibar (508), —all collected by Crossland.

SCRUPOCELLARIA JOLLOISII (*Savigny & Audouin*). (Plate **10.** figs. 5–10.)

Acarmarchis Jolloisii, Aud. "Description de l'Égypte," Hist. nat. p. 240; Savigny, pl. 11. fig. 2 (on plate "Cellaires").

Zoarium large (over 30 mm.), spreading out in fan-shape; many zoœcia in an internode (17 counted in one case). Zoœcia with large, wide, nearly round area, having a small spine at each upper corner, and one stout one, representing a scutum, across the middle of the area; along the median line of the zoarium a small triangular avicularium to each zoœcium, pointing downwards. The ovicells are wide, with large perforations over the surface and a thickened band at the proximal edge.

On the dorsal surface the divisions between the zoœcia are very wide, as figured by Savigny, and there is a large vibracular chamber near the proximal end of the zoœcium, with a radicle chamber below the vibracular chamber. The vibracular setæ are about the length of two or three zoœcia, and are smooth, recurved at the end. There is one vibraculum at a bifurcation. The radicles are large smooth tubes, often connected to the other branches as in *Canda arachnoides*, Lamx.

There are vermiform bodies at the side of the zoœcium (fig. 10), extending to the proximal end, but starting from the fleshy mass at the distal end. In one case there are oval masses in the vermiform body which show ridges, but this may be a postmortem change. The whole organ must be compared with the bodies I described † in *Bugula bicornis*, Busk, though the histological structure is not quite the same (fig. 10). There are about 16 tentacles.

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* Waters, Quart. Journ. Geol. Soc. vol. xlviii. (1891) p. 5, pl. 1. fig. 11.

† Résultats du Voy. du S.Y. 'Belgica,' Bryozoa, p. 21, pl. 1. fig. 4 (1904).

Loc. Suez, "among coral," collected by Crossland; Ras el Millan, collected by Hartmeyer.

SCRUPOCELLARIA BERTHOLLETII (*Audouin*).

Scrupocellaria Bertholletii, Hincks, Ann. Mag. Nat. Hist. ser. 5, vol. xvii. (1886) p. 258, pl. 9. figs. 1, 2.

Acamarchis Bertholleti, Audouin, "Descrip. de l'Égypte," Hist. nat. vol. i. p. 241, pl. 11. fig. 3. The plate is marked *Cellaires.*

Cellularia gracilis, d'Orb. Pal. Franç. vol. v. p. 50 (1850).

Scrupocellaria capreolus, Heller, "Bry. Adriat.," Verh. k.k. zool.-bot. Gesellsch. Wien, vol. xvii. p. 87, pl. 1. fig. 1 (1867).

Cellularia capreolus, Ostroumoff, "Étude Zool. et Morph. de Bry." Arch. Slaves de Biol. p. 565, pl. 2. figs. 23–26. This is the translation of a Russian paper, 1886.

Scrupocellaria reptans var. *Bertholletii*, Waters, "Bry. from Rapallo," Journ. Linn. Soc., Zool. vol. xxvi. (1896) p. 6, pl. 1. figs. 18, 19.

I have already shown how the characters correspond with those of *S. reptans*, L., in which, however, the scutum is usually more developed, though in these two forms we seem to have a pretty complete range from zoœcia without a scutum to those with a broad scutum protecting the whole area. It is, however, perhaps more convenient to retain the specific name of *Bertholletii.*

Loc. Naples, Capri, Rapallo, Trieste, Cape Verde Islands, Suez (9), and underside of buoy (14), collected by Crossland.

SCRUPOCELLARIA SERRATA, sp. nov. (Plate **10**. figs. 11–14.)

Zoarium with narrow branches, and short internodes having 5–8 zoœcia. Zoœcia long and narrow, area about half the length of the zoœcium, with two outer spines and one inner; the scutum is delicate and cervicorn, ranging, however, from the simple spine to the multi-cervicorn forms as in *S. Bertholletii*, Aud. There are no median, and to most zoœcia no lateral avicularia, nor are there any vibracula; however, to some zoœcia standing out from the side just below the ovicell there is a large avicularium (fig. 11), and these have long narrow mandibles, which are bifurcate or trifurcate at the end, with spinous processes at the side (fig. 14). Some pieces have no avicularia. *S. varians*, Hincks, and *S. obtecta*, Haswell, also have a large lateral avicularium. The radicle is attached to a chamber close to the base of the zoœcium and is thin and serrate. Busk mentions the radicles of *S. Macandrei*, Busk, and *S. ferox*, Busk, as being serrate. The globular ovicells are perforated. There are 14 tentacles.

This species has the habit and many of the characters of *S. Bertholletii*, Aud., but differs from it in having, as a rule, no avicularia and no vibracula.

Loc. Suez, about 5 fath., collected by Crossland.

SCRUPOCELLARIA MANSUETA, sp. nov. (Plate **10.** fig. 15.)

Zoaria widely expanding, usually 8 zoœcia to an internode. Zoœcia with large area about two-thirds of its length, wider at the distal end and without spines. There is no scutum, though in a few zoœcia I have found a stout spine exactly corresponding with that of *S. Jolloisii*, Aud., and in each case the spine occurred on the zoœcium just below the bifurcation and on the left side. The small median avicularia are directed diagonally downwards, there is a small lateral avicularium, and on the dorsal surface a vibraculum by the side of the proximal end of the zoœcium, while at the bifurcation there is one vibraculum. The ovicell is widely open and perforate.

S. mansueta differs from *S. Jolloisii* in not usually having oral spines or a stout spine over the area, but the occasional occurrence of this spine confirms the relationship; also in most characters there is a great similarity to *S. ferox*, Busk, in which, however, the median avicularia are much larger.

The name is given from the unarmed character of the species, in comparison with *S. Jolloisii*, Aud. There is a somewhat similar though more delicate form from Zanzibar in which there are three external and one internal spine.

Loc. Suez, on sponge from underside of a buoy (23), collected by Crossland; Ras el Millan, collected by Hartmeyer.

SCRUPOCELLARIA SCRUPEA, *Busk*, var. DONGOLENSIS, nov.

Scrupocellaria scrupea, Thornely, "Manaar," p. 109.

There is a very stout penduncle to the scutum; and close to the base of the peduncle, but on the zoœcium next laterally, there is a very minute avicularium; the lateral avicularia are very large, and the vibracular chamber extends diagonally nearly to the median line of the zoarium. The setæ are smooth, and shorter than a zoœcium. The radicles are wide, long, and as a rule smooth, but occasionally they are toothed at the end only. The ovicell is smooth, imperforate, and the operculum is entirely separable, as we have seen in *Caberea Boryii*, Aud., and *C. Darwinii*, Busk. There are two spines on the outer border and one on the inner, and there are two vibracula at a bifurcation, as in *C. Delilii*, Aud., to which it is closely allied. The northern form *S. scabra* has only one vibraculum at a bifurcation.

S. scrupea, Busk, *S. Macandrei*, Busk, *S. Delilii*, Aud., *S. scabra*, Van Ben., seem to form a closely allied group; and from what I have seen of specimens from the East, I am inclined to believe that this variety is what has frequently been called *scrupea* from the Indian and China Seas. There are 13 tentacles: in *S. scabra*, Van Ben., there are 16; in *S. Smittii*, Norm., 15; in *S. serrata*, Waters, 15; in *S. reptans*, L., 14–16 (Hincks); *S. Jolloisii*, Aud., 16.

Loc. Naples (one specimen in A. W. coll.); Trincomalee (B. Mus. coll.).

Khor Dongola, among corals on a reef (19); Beacon Island (6) and Engineer Island, Khor Dongola, collected by Crossland. Manaar.

BICELLARIA CILIATA (*Linnæus*).

For synonyms see Miss Jelly's Catalogue and add Levinsen, "Mosdyr," Zool. Danica, p. 46, pl. 1. figs. 32–35.

The specimens from the Sudan have both the zoœcia and the area somewhat smaller than those of my Naples or British specimens.

Nitsche * describes the ovicell of this species, which is very curious in being pedunculate; but not all species of *Bicellaria* have pedunculated ovicells, as, for instance, *B. tuba* and *B. grandis*, in which they are terminal. Again, in the group of *Bugula neritina* the ovicell is pedunculate, but it is not a general character in *Bugula*, and the same is the case in *Stirparia*, where some only have a pedunculated ovicell. This shows how careful we must be in the use of one character, for at first sight we should expect such a divergent form of ovicell to be of at least generic value. This question is also referred to under *Bugula neritina*.

Loc. Northern, British, Mediterranean, Australian, S. Africa; Khor Dongola, Red Sea (19), on coral-reef, collected by Crossland.

BUGULA AVICULARIA (*Linnæus*).

This species occurs from the Arctic; Northern Seas; Mediterranean; Charlotte Island; N.E. coast of America; Australia. Suez, from Mediterranean ship 'Thyra' (9); from buoy at entrance to canal, Suez (14); Nerskah Makdah, 5 fath. (12), collected by Crossland.

BUGULA NERITINA (*Linnæus*). (Plate **11**. figs. 1–3.)

For synonyms see Miss Jelly's Catalogue and add:—

Acamarchis neritina, Aud. "Descrip. de l'Égypte," Hist. nat. vol. i. p. 240, pl. 11. fig. 1.

Bugula neritina, Calvet, "Bry. Mar. de Cette," p. 21; Thornely, "Manaar," p. 109, (?) Rec. Indian Mus. p. 183 (these last two are probably var. *minima*); Philipps, Polyzoa from Loyalty Island, p. 443; Robertson, Non-Incrusting Bry. p. 266, pl. 9. fig. 47, pl. 16. fig. 97.

Acamarchis prismatica, Gray, Dieffenbach's New Zealand, vol. ii. p. 292.

The ovicell of *Bugula neritina* has usually been unsatisfactorily figured and imperfectly understood, but Nitsche † has given a description and figure of the ovicell of *Bicellaria ciliata*, L., and the two are very similar. The ovicell of *B. neritina* is pedunculate and attached at the inner upper corner of the zoœcium. A fleshy mass grows out laterally from the inner side of the zoœcium near to the distal end, but not close up to it; this gradually becomes larger, and then below it a minute portion of calcareous shell commences to grow and ultimately surrounds the ovicell (fig. 1). The mature ovicell is always directed laterally.

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* Zeitsch. für wissensch. Zool. xx. p. 4 (1869).

† Tom. cit. p. 3.

A similar lateral pedunculate ovicell occurs in *Bicellaria ciliata* (L.); *B. uniserialis*, Hincks; *Stirparia ciliata,* Robertson; *S. occidentalis*, Rob.; *S. californica,* Rob.; *S.* sp. 1, MS.; *S.* sp. 2, MS.; *S.* sp. 3, MS., Zanzibar.

There are two or three forms with avicularia which may have to be called varieties of *neritina*, but all have similar ovicells, among them is *B. robusta*, MacG.*. *Bugula calathus*, Norm., *B. dentata,* Lamx., *B. ditrupa*, Busk, *B. avicularia*, L., *B. Sabatieri*, Calvet, *B. Murrayana*, Johnst., *B. cucullata,* Verrill, all have ovicells central—that is, attached by their whole width, commencing in the same way by a small projection over which the calcareous wall ultimately grows. Now all these species are so similar to *B. neritina* in most characters and in the avicularia, that we feel satisfied they all must remain in the same genus, in spite of the very marked difference in the ovicell. We have the lateral pedunculate form of ovicell in some *Bicellaria* and apparently in all *Stirparia* (a genus, in my opinion, most closely allied to *Bicellaria*, though not so closely to *Bugula*); on the other hand, in *Bicellaria tuba*, Busk, and other species of *Bicellaria* the ovicell is central and attached the whole width.

The ovicells must be a most important character in classification, but finding the same two distinct forms occurring both in *Bugula* and in *Bicellaria* is a warning as to the care that must be exercised in using the ovicells or indeed any one character too exclusively.

Loc. Atlantic, Mediterannean, Indian Ocean, Ceylon, (?) Australia, Loyalty Island, Rio de Janeiro, California; Honduras (*B. M.*). Suez Bay, 10 fath. (10); Canal entrance, on buoy (14); Floating Stage (15); Suez (9, 13, 16, 20); Khor Shinab, 10–12 fath. (3), collected by Crossland.

BUGULA NERITINA, var. MINIMA, nov. (Plate 11. figs. 4–7.)

Bugula neritina, Waters, "Australian Bry.," Ann. Mag. Nat. Hist. ser. 5, vol. xx. p. 91, pl. 4. figs. 3 & 15; and probably Thornely, "Manaar," p. 109, Rec. Indian Mus. p. 183.

There are forms from the Red Sea in which the colour is much lighter than in *B. neritina* typica, but there are similar light brown linear pigment cells, both zoaria and zoœcia are more delicate; the zoœcia are shorter, being about 0·65 mm. long, while the type is usually about 1·1 mm. There are, however, considerable variations in size; also in *B. avicularia* there is material variation in the colonies, and even in one colony I measured zoœcia 0·55 long and others 1·1 mm. long. There are only about 6 zoœcia from one bifurcation to the next in the var. *minima*, whereas the branches of the type are longer, having about 10 zoœcia. The specimen from Ball's Head, New

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* *B. robusta,* MacG., occurs in S. Africa as well as in Australia.

South Wales, is stouter than the Red Sea one, but I think it must be placed with *minima* and perhaps shows us a link to *B. robusta* *.

There is in *minima* a long beaked avicularium, growing from a tubular basis, close to the proximal end of the zoœcium; and here, again, there is variation in size, as those nearer the extremity are the longest and largest. Very stout radicles grow from the middle of the dorsal surface.

The globular ovicell is attached to the side of the zoœcium and opens laterally, just as in the ordinary *B. neritina*, L.; *B. robusta*, MacG., has similar lateral ovicells, but the avicularia are nearly globular, while *B. cucullata*, Busk, has the avicularia somewhat higher and the ovicell terminal. Most of the *Bugulæ* have the avicularia attached near the distal end, but in this variety, in *B. robusta*, MacG., and in *B. cucullata*, Busk, they are near to the proximal end. In the Zanzibar specimens there are two or three clear spots on the dorsal surface, at the outer upper corner of the zoœcium. The specimen from Khor Dongola have somewhat smaller zoœcia and much smaller avicularia than those from Nersa Makdah.

Loc. Ball's Head, N. S. Wales (*W.*). Prison Island, Zanzibar Channel, 8 fath., on *Meleagrina margaritifera*; Khor Dongola (2); Nersa Makdah, 5 fath., on stem of antipatharian (12); Agig Suraya (21),—collected by Crossland.

Other tropical species of *Bugula* are *B. dentata*, Lamx.; *B. mirabilis*, Busk; *B. versicolor*, Busk; *B. reticulata*, var. *unicornis*, Busk.

BEANIA INTERMEDIA (*Hincks*).

Diachoris intermedia, Hincks, Ann. Mag. Nat. Hist. ser. 5, vol. viii. (1881) p. 74, pl. 5. fig. 8; Thornely, Rec. Indian Mus. vol. i. pt. 3, no. 13 (1907) p. 184.

Beania intermedia, MacG. Zool. Vict. dec. xx. (1890) p. 346, pl. 195. fig. 3; Waters, Ann. Mag. Nat. Hist. ser. 7, vol. xvii. (1906) p. 15, pl. 1. figs. 16–18.

In the specimen from the Canal entrance, Red Sea, the spinous processes on each side, described by Hincks, are absent, whereas in the Chatham Island specimens they sometimes occur, but much lower than figured by Hincks, and very small. In the specimen that I figured there were none.

Loc. Tasmania (*Hincks*); Victoria (*McG.*), Napier and Wellington (*Hamilton*), Chatham Island (*Waters*). Lat. 6° 6′ 30″ N., long. 81° 23′ E., 32 fath., and off Ganjam Coast, 35 fath. (*Thornely*). Suez Canal entrance, also one zoœcium on *Amathia* from s.s. 'Thyra' docked at Suez (9), collected by Crossland.

MEMBRANIPORA SAVARTII (*Audouin*). (Plate **11.** figs. 8–13.)

Flustra Savartii, Aud. "Zool. d'Égypte," p. 240, pl. 10. fig. 10.

Membranipora Savartii, Busk, Crag Polyzoa, p. 31, pl. 2. fig. 6 (1859).

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* Busk gave the name *capensis*, MS., to a S. African species, but from specimens in my collection, one of which was named by Busk, this is *B. robusta*, MacG.

Biflustra Savartii, Smitt, Floridan Bryozoa, pt. ii. p. 20, pl. 4. figs. 92–95 (1873); Busk, Zool. Chall. Exp. vol. x. pt. xxx. p. 67, pl. 14. fig. 2; Manzoni, "Castrocaro," p. 38, pl. 2. fig. 17 (1875).

Biflustra delicatula, Busk, Crag Polyzoa, p. 72, pl. 2. fig. 7 (1859); Manzoni, Bry. Plioc. Ital. 2nd cont. p. 4, pl. 1. fig. 5 (1869); MacGillivray, Zool. Vict. dec. vi. p. 28, pl. 57. fig. 2. (1881).

There has been much uncertainty concerning this species and its range; for *Membraniporæ* have been obtained from many places, only differing, firstly, in the absence of the two small tubercles shown by Savigny, and, secondly, some have a broad serrate denticle at the proximal end of the opesia.

The specimens from Suakim (7) have neither tubercle nor serrate denticle, whereas a small incrusting specimen on *Retepora* from the Red Sea, lat. 16° N., long. 41° W., 30 fath., collected by Siemens & Löffler, has the serrate denticle directed inwards towards the basal wall (fig. 13). In the specimens from Suakim Harbour the zoarium is at first loosely incrusting, and from this adnate growth arise erect cylindrical or compressed branches dividing dichotomously (fig. 10).

In these there is a row of communication plates across the distal wall about halfway between the front and the base; sometimes the row is double or irregular, with a tendency to form two groups. In a specimen of *Membranipora* from Penang, which has large tubercles and a narrow brown line surrounding the zoœcia as described by Busk for *M. denticulata*, the two distal rosette-plates are near the base in the corner. This must probably be separated from *Savartii*.

The specimens from Suakim are fragile and have not a great amount of calcareous matter, and there are no denticles either in the adnate portion or in the branches, though in specimens from Khor Dongola (4) there are no denticles in the younger portion, while they occur in the older branching parts; but in neither case are they found in the adnate basal cells. MacGillivray * says, when speaking of *M. delicatula*, "the serrated denticle at the bottom of the aperture exists only in two or three cells of the Queenscliff specimen and is altogether absent in those from Queensland"; and Busk, in describing *M. denticulata*, says "one or two rounded or triangular eminences (probably ovicells) are visible on many of the cells in front and below." The tubercles are not described from the Crag, nor were they found by Smitt, but tubercles in this group are very variable; and I therefore follow other workers in placing under *Savartii*, Aud., species with and without tubercles. The simplest forms of the group have no tubercles, no serrate denticle, and the communication pores are more or less in a line, whereas in others the line is broken up into two groups. There are normally four lateral rosette-plates.

A specimen from Zanzibar has proximal narrow cervicorn denticles, and another from Zanzibar contains an astonishing amount of the parenchym threads which often form quite thick cords, seen, however, to be formed of finer threads. Granular masses, which stain, are sometimes included in these cords.

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* Prod. Zool. Vict. dec. vi. p. 28.

There are 15 tentacles, and I have seen no intertentacular organs.

Loc. Florida ; Victoria ; Queensland ; Ceylon ; Indian Ocean ; Zanzibar ; Khor Shinab (3), Khor Dongola, 9½ fath. (4), Suakim, 5 fath. (7, 8), Suez Docks (20), collected by Crossland ; lat. 16° N., long. 41° W., 30 fath., and Gimsah Bay, collected by Loffler & Siemens. It is also found fossil in the Crag and the Tertiaries of Europe, Australia, and Egypt, and probably some Cretaceous fossils known under other names should be placed here, but the discussion of the fossils is postponed to a future occasion.

MEMBRANIPORA ? BURSARIA (*MacGillivray*). (Plate **12**. fig. 10.)

Amphiblestium bursarium, MacG. Trans. R. Soc. Vict. vol. xi. (1886) p. (3), pl. 2. fig. 2.
Siphonoporella bursaria, Thornely, "Manaar," p. 111.

Miss Thornely is right in placing this with the *Siphonoporella* of Hincks, though it is doubtful whether the genus can be retained. I have a specimen from West Australia sent to me as *Siphonoporella nodosa*, Hincks, and which I believed to be the co-type, though it does not correspond entirely with Hincks's figure and description, as it has a tubercle at each top corner of the zoœcium and it has a vicarious avicularium, broader and shorter than the one figured on my *M. bursaria*, var. *phillipensis* *. Hincks wrote "no avicularia," and in no specimens that I have seen are they frequent, being only found here and there. Hincks does not seem to have correctly appreciated what he called a siphon, for it is a tube † or neck through which the polypide is extended from the broader part of the zoœcium to the surface ; and in this group, instead of being central as in *Micropora*, *Steganoporella*, *Thalamoporella*, it is frequently entirely to one side, with a large hollow space on the other side. In *Micropora*, as shown by Jullien, these two hollow spaces, or opesiules, contain the muscles, which pass from the base up to the membrane covering the zoœcium, thus drawing the membrane down and acting as a compensation sac. Now in *Siphonoporella nodosa*, H., although usually lateral, we sometimes see a hollow on each side ; while, on the other hand, some specimens of *M. bursaria*, from Victoria, only occasionally show the lateral position, so that it may be readily overlooked.

The Red Sea specimen, although in spirit, must have been long dead when collected, and I have been unsuccessful in obtaining any material for studying the opesial muscles ; however, the operculum is Membraniporidan, and we seem here to be able to follow the changes from such a form as *M. Rosselii* up to irregular *Siphonoporella* of Hincks. *Siphonoporella* and *Thairopora* are surely synonyms, of which *Thairopora* is the more satisfactorily diagnosed. Harmer, in his "Revision of the Genus *Steganoporella*," refers to the structure of *Siphonoporella* *.

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* Journ. Linn. Soc., Zool. vol. xxvi. (1898) p. 690, pl. 49. fig. 11.

† See Waters, "On Australian Bry.," Ann. Mag. Nat. Hist. ser. 5, vol. xx. p. 186 & fig. *a.*

Loc. Victoria, Ceylon; Engineer Island, Khor Dongola, collected by Crossland.

MEMBRANIPORA LIMOSA, sp. nov. (Plate **12.** figs. 1–5.)

The zoarium attains to at least 80 mm. in length, and is formed of long, quadrilateral, dichotomising branches; except for a short distance below the bifurcation there are four zoœcia in a series; but where the branches divide the zoarium is hexagonal. It bifurcates at a rather narrow angle, about 40°, and in this respect corresponds with several species of *Farciminaria*. The zoarium is about 0·6 mm. in width, the horny walls are thick but contain a moderate layer of calcareous matter. At the bifurcation the walls of the zoœcia become phenomenally thick, and in these thick-walled zoœcia no polypides were found.

The zoœcia are about 0·85 mm. in length, and the opesia about 0·6 mm. At the base of the opesial opening there is a small denticle, which often spreads out at the end. The denticle may easily be overlooked until preparations are made. No ovicells or avicularia have been found. There are numerous distal pores round the edge.

There are 15 tentacles, and sections do not reveal any intertentacular organ; but I have found it impossible to cut satisfactory sections of this species.

The zoarial growth is the same as that of *Farciminaria*, but the zoœcia are so Membraniporidan and similar to the *M. Savartii* group, that it is placed under *Membranipora*. The ovicells of *Farciminaria* differ considerably from those of *Membranipora*.

The zoœcia are much shorter than in any 'Challenger' *Farciminaria*, which vary from 1·26 mm. to 2·78 mm., while *F. Alice*, Jull. & Calv., is 2·36 to 2·55 mm. Busk calls *Farciminaria* an "emphatically abyssal" genus, although *F. brasiliensis* occurs from 32–400 fathoms. The *M. limosa* seems to be abundant, and is found from 10 fathoms in mud, from which cause the name is chosen. MacGillivray † says that the three Australian species of *Farciminaria* were dredged from a depth of 10–15 fathoms.

Busk, in his 'Challenger' Report, gives the genus *Farciminaria* as "submembranaceous or corneous," but all have a thin calcareous skeleton; even *F. uncinata* has thin calcareous walls, and the inner wall of the ovicell is entirely calcareous. *F. aculeata* and other species have a Membraniporidan operculum, and doubtless *Farciminaria* and *Membranipora* are closely allied. *Farciminaria magna,* B., has about 28 tentacles.

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* Quart. Journ. Micros. Sci. vol. xliii. p. 232 &c.

† Prod. Zool. Vict. dec. xvi. p. 219.

M. limosa is much like *Quadricellaria oblonga,* d'Orb., from the Chalk.

Loc. "Abundant in patches on the otherwise mud bottom of the Khuro," Khor Shinab, Red Sea, 10–12 fath. (3), and Khor Dongola, 20 fath., mud (2, 5), collected by Crossland.

THALAMOPORELLA ROZIERI (*Audouin*). (Plate **15**. figs. 12–15.)

Flustra Rozieri, Aud. Zool. Égypte, p. 239, pl. 8. fig. 9.

Thalamoporella Rozieri, Hincks, Ann. Mag. Nat. Hist. ser. 5, vol. xix. p. 164; Waters, Ann. Mag. Nat. Hist. ser. 5, vol. xx. p. 186; Kirkpatrick, Ann. Mag. Nat. Hist. ser. 6, vol. i. p. 75.

Reptescharellina Rozieri, d'Orb. Pal. Franç. vol. v. p. 453.

Membranipora Rozieri, Busk, Brit. Mus. Cat. ii. p. 59, pl. 65. fig. 6; MacGillivray, Monog. of Tert. Polyzoa of Victoria, p. 52, pl. 6. fig. 10 (1895).

Steginoporella Rozieri, Smitt, Floridan Bry. p. 16, pl. 4. fig. 102.

Steganoporella Rozieri, Hincks, Ann. Mag. Nat. Hist. ser. 5, vol. vi. p. 379 (28).

Steganoporella Smittii, Hincks, Brit. Mar. Poly. p. 178, pl. 24. figs. 5, 6 (1880); Goldstein, Bry. from the Marion Island, Proc. Roy. Soc. Victoria, p. 7 note (1881).

Thalamoporella Smittii, Hincks, Journ. Linn. Soc., Zool. vol. xxi. (1887) p. 123; Thornely, Rec. Indian Mus. vol. i. pt. 3, no. 13, p. 187 (1907).

Steganoporella Rozieri form *indica,* Hincks, Ann. Mag. Nat. Hist. ser. 5, vol. vi. p. 379 (29), pl. 16. fig. 1; Waters, Q. J. Geol. Soc. vol. xxxviii. (1882) p. 505, vol. xli. (1885) p. 292; Philipps, "Loyalty Island," p. 440 (1889); Thornely, "Manaar," p. 112 (1905).

The small tuberosity at the side of the aperture is very variable, and in specimens from Khor Dongola the knobs are sometimes developed, but not always, and are but small; again, in those from Rasel Millan they are occasionally seen where the walls meet, while in specimens from the Cape Verde Islands they are practically absent. Hincks created a variety *indica* for those forms without a tuberosity; but this form is general from the Cape Verde Islands, through the Red Sea, Manaar, to Australia, recent and fossil. The size of the zoœcia in all that I have seen is about the same. The ring-canal is very large, and the ovarian cells are surrounded by a coarse network. In the ovaria of most Bryozoa the ovarian cells are quite close together, and are surrounded by the follicle-cells, as figured by Vigelius * and others, but in some species these ovarian cells are partly surrounded by a coarse cellular network. This structure must probably be compared with what I have described in a species of *Alcyonidium* †.

There are 17–19 tentacles.

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* Vigelius, W. I., "Die Bryozoen . . . . des Willem Barents," Bijdr. tot de Dierkunde, vol. xi. pl. iii. fig. 39 (1884).

† "Bryozoa from Franz Josef Land," Journ. Linn. Soc., Zool. vol. xxix. (1904) p. 180, pl. 20. figs. 8, 9, 10.

The ovicell has frequently been described as bilobate, though apparently the real structure has not been appreciated, for it really is a double ovicell in which there are two or more larvæ, and in the sections cut one is a little older than the other. In one specimen there is an ovicell containing three larvæ, and in another ovicell there is an indication of there having been three. There is no complete divisional wall in the ovicell.

On my specimens from Darnley Island, and in those described by Haswell from Holborn Island and Port Denison (Queensland), all of which form a tubular growth, no ovicells or avicularia have been seen, and without these organs it is impossible to feel absolutely certain of the determination. However, the zoœcia, in size and structure, are identical with those of *Th. Rozieri* from other localities.

Goldstein, *loc. cit.*, mentions it from Port Darwin as *S. Smittii*, and says that he has it "showing every stage from the ordinary encrusting form, through the free, erect, hemescharal and escharal forms."

Loc. Florida (*Sm.*); Britain (*H.*); Mediterranean, in Busk collection as *Steganoporella bifoveolata*, Heller; Manaar (*Th.*); Palk Bay, Galle (*Th.*); Pedro Shoal (*Th.*); Lifu (*Ph.*); Darnley Island (*W.*); Holborn and Port Denison, Queensland (*Haswell*); Mauritius (*Kirkp.*); Rio de Janeiro (*B.*); Port Darwin (*Gold.*); West Australia (*Gold.*); Cape Verde Island (*Cross. Coll.*); Khor Dongola (19), Red Sea, collected by Crossland; Gimsah Bay and Ras el Millan, collected by Hartmeyer.

Fossil. Bairnsdale, Gippsland (*W.*); River Murray Cliffs (*W.*); Victoria (*MacG.*).

TUBUCELLARIA CEREOIDES (*Pallas*).

This has been dealt with in my paper on *Tubucellaria*, Journ. Linn. Soc., Zool. vol. xxx. (1907) p. 126, pls. 15 & 16.

MICROPORELLA CORONATA (*Audouin*). (Plate **12**. figs. 6–9.)

Flustra coronata, Sav. & Aud. "Descr. de l'Égypte," p. 239, pl. 9. fig. 6.

Flustra umbracula, Sav. & Aud. *loc. cit.* p. 239, pl. 9. fig. 7.

Lepralia californica, Busk, Journ. Roy. Micr. Soc. vol. iv. p. 310, pl. 11. figs. 6, 7 (1856).

Lepralia lunifera, Haswell, "Polyzoa from Queensland Coast," Proc. Linn. Soc. New South Wales, vol. v. p. 40 (1881).

Lepralia ciliata, var., Waters, Ann. Mag. Nat. Hist. ser. 5, vol. xx. p. 188 (1887).

The mandibles are long, directed straight forwards as figured by Savigny. The ovicells are not large, granular, and sometimes umbonate. There are usually 4 spines, though sometimes 5 or even 6, and there are large pore-chambers, about 16 to a zoœcium. The mandibles have a projection on each side directed inwards, not far from the base.

Flustra umbracula as figured by Savigny is very similar, although a lip is shown in fig. 7_2, and the ovicells are large, but on fig. 7_4 not unduly so.

The *L. californica* of Busk is shown with the avicularia high up, and he says "above," which presumably means above the oral pore. Hincks shows the avicularia much lower down, and it is not clear that Hincks was describing the same species as Busk.

I only know *M. ciliata*, Pall., *M. coronata*, Aud., *M. impressa*, Aud., *M. Malusii*, Aud., *M. personata*, Busk, from the tropics. *M. coronata* belongs to the *ciliata* group, and it is a question whether it should be called a variety.

Loc. Holborn Island, Queensland (*Hasw.*), Sydney (*Wat.*), California (*B.*). From bottom of ship 'Fayoum' in Suez docks (18) & (20), collected by Crossland; Gimsah Bay, collected by Hartmeyer. [Nice and Ajaccio (*Calvet*).]

MICROPORELLA CILIATA (*Pallas*).

Loc. Cosmopolitan; Engineer Island, Khor Dongola on *Hydrocorallina*, collected by Crossland; Ras el Millan, collected by Hartmeyer.

SCHIZOPORELLA UNICORNIS, *Johnston*. (Plate **12**. figs. 12, 13.)

Lepralia unicornis, Johnst. Brit. Zooph. ed. 2, p. 320, pl. 57. fig. 1 (1847).

Add to Miss Jelly's list of synonyms:—

Lepralia unicornis, Barrois, Embryol. des Bryozoaires, p. 152, pl. 8. figs. 30, 33, 35, 37.

Schizoporella unicornis, Pergens, "Unters. an Seebryozoen," Zool. Anzeiger, Nos. 317–318, p. 12 (1889); Waters, Quart. Journ. Geol. Soc. vol. xlvii. (1891) p. 27; Ortmann, Die Japanische Bryozoenfauna, p. 49, pl. 3. fig. 35 (1890); Calvet, Bry. Mar. de Cette, p. 40 (1902); Bry. Mar. de Côtes de Corse, p. 20 (1902); Bry. de 'Hirondelle,' p. 138 (1903); Nordgaard, Norwegen Fiords, p. 165, pl. 5. figs. 23, 25 (1905); Canu, Bry. Tert. de la Tunisie, Exp. Sc. de la Tunisie, p. 24, pl. 34 (1904); Thornely, "Manaar," p. 114; Neviani, Bull. Soc. Geol. Ital. vol. xv. p. 20, fig. 4 (1896); Bri. d. Form. plioc. & post-plioc., *op. cit.* vol. xvii. p. 11; Bull. Soc. Romana p. gli St. Zool. vol. iv. pp. 6, 14, 20; pt. iv. p. 7; pt. v. p. 13; Bri. foss. di Carrubare, p. 511; Bri. foss. della Farnesina, Paleont. Ital. vol. i. p. 114, pl. 6. figs. 8–11 (1895); Bri. neog. delle Calabrie, *op. cit.* vol. vi. p. 196 (1900).

Reptoporina rugosa, d'Orb. Pal. Franç. vol. v. p. 443. See Waters, Ann. Mag. Nat. Hist. ser. 7, vol. xv. p. 8.

This is a species about which there has been some confusion, and to a large extent it arose through Busk not recognising the differences between this species, *S. sanguinea*, Norm., and *S. spinifera*, Johnst.; but all three can be recognised by the opercula. In *S. sanguinea* the muscular attachment is close to the border, whereas in *S. unicornis* the muscles are attached some little distance from the border. Further, in *S. unicornis* oral glands have not been met with, while in *S. sanguinea* they are large and well developed. Oral glands have not been met with by me in any species of *Schizoporella*, where the opercular attachments are some distance from the border, but they are known in *S. sanguinea*, Norm., *S. Harmsworthii*, Waters, *S. auriculata*, Hass., *S. serratimargo*, Hincks, *S. arrogata*, Waters, *S. linearis*, Hass.

S. unicornis, J., is one of the most abundant species in the northern hemisphere, and it was also very abundant throughout the whole of the Tertiaries, and therefore it is not surprising that it is subject to considerable variation. It has not been mentioned from Australia, but Mr. Hincks records it from S. Africa.

There are about 18 tentacles, and frequently in large pieces no ovicells are seen. It is frequently darkly pigmented. From the floating stage in Suez docks, which "has been afloat several years," there are pieces 1–2 cm. thick composed of many layers, and from Cape Verde Island there is a piece about 0·7 mm. thick, and about 17 cm. × 14 cm. They are not, however, formed of simply superimposed layers, but of superimposed zoœcia, so that the lateral distal walls are continuous throughout the whole thickness. This regularity is a great surprise, and I hope to deal with it when I describe the Cape Verde collection; however, I may state that *Schizoporella viridis*, Thornely, which also grows in solid pieces, has no such continuous growth, and in section the zoœcia are seen to be one over another, alternately like tiles; also in *Cellepora* there is considerable irregularity. In some solid growths of Bryozoa the layers are almost independent; however, in multilayered Melicertilidæ the cells occur in a definite position one over the other, in a way which surprised me when I made the sections*. The question now raised is a very large one, of some palæontological interest, but it has been recognised too late for full examination in this paper.

Loc. Greenland, Scandinavia, British, Atlantic, Cape Verde Islands, Mediterranean, Indian Ocean, Japan, Loyalty Islands, South Africa (*Hincks*). From Suez Docks (13) (15), Suez Canal entrance (14), ship 'Fayoum,' Suez (20), Agig Suraya (21), Cape Verde Island (2) (3), Zanzibar from bottom of s.s. 'Juba,' which always remains in Zanzibar waters (511), collected by Crossland.

Fossil. Throughout the Tertiaries of Europe from the Bartonian of Italy, occurring in England, France, Austria, Russia, abundantly in Italy, Algiers, and Tunis.

SCHIZOPORELLA UNICORNIS, var. (Plate **12**. fig. 11.)

There is a form concerning which it is doubtful whether it should be separated as a variety or not. The zoarium is Hemescharan, and often the adnate portion throws up tubular or cup-shaped growths, and the polypides extend diagonally across the zoœcium with the oral aperture in one corner.

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* Ann. Mag. Nat. Hist. ser. 6, vol. viii. p. 52, pl. vi. figs. 4, 5 (1891).

This also is seen in typical *S. unicornis*, though not usually as marked. This is what Pallas described as *Eschara spongites* *.

Although many large pieces have been examined, no ovicells have been found. There are about 18 tentacles. The surface pores of this variety are usually larger than those of *S. unicornis* typica.

Pallas described this species, and referred to the diagonal arrangement of the polypides, and (p. 45) says "& osculo, ad alterum plerumque latus declinato." He refers to figures by Imperato, Besler, and Gaultier; but the figures of Imperato are very unsatisfactory, merely representing some incrusting growth on the root of a seaweed, but there is nothing to indicate the genus or species, or even the order. However, I have frequently seen *Schizoporella sanguinea* in the Mediterranean incrusting this seaweed just as figured. Gaultier's figure to which Pallas refers occurs on the back of a titlepage. The titlepage of each part has the figure of a coral on the back, and the tail-pieces are also corals, each with a short description. Gaultier's figure is very characteristic of what I described as *S. errata*, and the inscription underneath is "Porus anguinus crustaceus tubulatus capsulis minimis ex Museo N. Gaultieri, No. 55." This was known as 'Lapis Spongiæ,' and was used medicinally. Doubtless the medicinal efficacy did not depend upon a strict adherence to one species or variety.

This is not the *S. spongites* of Smitt, Hincks, and Thornely, showing how dangerous it is to try and identify species insufficiently described by older authors.

I have seen this variety in Lamarck's collection marked *spongites*, but there were some other things also with the same name.

Loc. Mediterranean, Naples, Corsica. From s.s. 'Thyra' from the Mediterranean, docked in Suez after being there one month (9).

SCHIZOPORELLA UNICORNIS, var. ANSATA, *Johnst.*

There is a small piece on *Lepralia japonica*, Bnsk, from the Bay of Agig Suraya (21), collected by Crossland. The surface is thickly punctured, there are no ovicells, the umbo is distinct, and the small triangular avicularia at each side are directed upwards, and there are also two large vicarious avicularia like those of *Lepralia occlusa*, Busk (see Pl. **14**. fig. 1). Vicarious avicularia have not been found before, but there are so many cases in which they sometimes occur and sometimes do not, that it is clearly a character to which we must not attach too much importance.

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* *Eschara spongites*, Pallas, Elench. Zooph. p. 45 (1766); Lamouroux, Expos. Méthod. p. 2, pl. xli. fig. 3.

Cellepora spongites, Risso, Hist. Nat. de l'Europe Mérid. vol. v. p. 337.

Lepralia errata, Waters, "Bry. of Naples," Ann. Mag. Nat. Hist. ser. 5, vol. iii. p. 39, pl. 10. fig. 5 (1879); "The Use of the Opercula in the Determination of the Cheil. Bry.," Proc. Manch. Lit. & Phil. Soc. vol. xviii. (1878) pl. 1. fig. 9.

Schizoporella errata, Calvet, "Bry. Mar. des Côtes de Corse," Trav. de l'Inst. de Zool. de l'Univ. de Montpellier, ser. 2, Mém. 12, p. 23 (1902).

Porus anguinus, Gualtieri, Index Testarum quæ adserv. in Museo Gualtieri, figure on the back of the titlepage to part 4 (1742–1744).

Cellepora spongites, Maratti, De Plantis Zoophytis et Lithophytis in Mari Mediterraneo viventibus, p. 56 (1776).

The appearance of *S. unicornis,* var. *ansata*, and *S. linearis* is very similar, but they can be distinguished by means of the opercula.

A specimen from Suez in the British Museum would seem to be this species. It has similar vicarious avicularia, but no ovicells were found. Busk had marked it *Duboisii*, Aud., but I think we are hardly justified in considering it to be that species.

SCHIZOPORELLA ARGENTEA, *Hincks*. (Plate **12**. figs. 17, 18; Plate **13**. figs. 16, 17.)

Schizoporella argentea, Hincks, Ann. Mag. Nat. Hist. ser. 5, vol. vii. (1881) p. 158, pl. 9. fig. 6; *op. cit.* ser. 5, vol. xv. (1885) p. 254, pl. 9. fig. 6; Thornely, "Manaar," p. 114 (1905).

The zoœcia are granular with small areolations round the border, and in some cases the granules near the border are arranged linearly like the beginning of ribs. There is a fairly large avicularium placed diagonally on the front, though in some pieces none are found. In the Red Sea specimens there is no avicularium in the aperture, nor are there any spines. The sinus of the aperture is very wide, and the operculum on the proximal edge has two projections instead of one, being quite different to any operculum yet met with, though reminding us of the operculum * of the ovicelligerous zoœcium of *Hippothoa hyalina*. The ovicell is large, long, perforated, and granular, and is closed by the operculum.

The dorsal surface has many large tubular projections for attachment; but there is not the regularity described by Hincks, who says "six prominent tubular projections," for in the Red Sea specimens there is sometimes only one. There is no diaphragm separating this radicle projection, and the polypide may be distorted by the irregularity, or the testes may extend into the projection.

There are 16–17 tentacles.

A specimen from Tahiti, sent to me by Miss Jelly, only shows the avicularia to two zoœcia, nor has it the oral spines, or the dorsal regularity described by Hincks. Apparently Hincks must have figured a somewhat exceptional piece, as my specimens are from the same lot as those described by him. In the African specimens the avicularium in the lip is more constant.

Loc. "Africa"; Tahiti; Manaar (*Th.*); Khor Dongola (2), Red Sea, Suakim (7), collected by Crossland.

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* Quart. Journ. Geol. Soc. vol. xliii. pl. 8. fig. 43.

SCHIZOPORELLA VIRIDIS, *Thornely*. (Plate **13**. figs. 1–8.)

Schizoporella viridis, Thornely, "Manaar," p. 116, fig. 3.
Schizoporella spiculifera, Busk, MSS.

The zoarium forms solid masses composed of many layers. The zoœcia are distinct, ovate, raised, with large pits having one, or sometimes two, perforations at the base, but between the pits there are very small raised nodules. Oral aperture subtriangular, with a small, acute, triangular avicularium at one or both sides of the sinus. There are large zoœcial avicularia about the same size and shape as the zoœcia, and the mandibles are long and narrow, with an indentation at the base.

The opercula have two muscular dots some distance from the wall of the operculum, and the poster is wide.

There are about 25 tentacles, and no oral glands in the sections cut.

There are but few ovicells, and these are large and globular, wider than a zoœcium. The ovicell is formed of two calcareous layers, and on the outer one there are raised ridges irregularly radial; between these ridges the pores of the lower layer are seen, these pores are much smaller and more numerous than those on the surface of the zoœcia. An ovicell broken down and showing the two layers is figured (fig. 2). The opening of the ovicell, which is a transverse slit, is quite separated from the oral aperture. The ovicell of *Cellepora serratirostris*, MacG.*, has a somewhat similar opening.

The large lateral umbo, figured by Miss Thornely, has not been seen on the Red Sea specimens, and occurs only sparsely in those from Manaar.

S. viridis is in many respects like *Cellepora Raigii*, Aud. (pl. vii. fig. 10), but Savigny figures it with a denticle, and therefore we must suppose that it was *Smittia*. Pl. vii. fig. 11 of Savigny has similar vicarious avicularia, but both this and the last have spines, whereas none are seen in the specimens from the Red Sea. *Schizoporella ampla*, Kirkpatrick †, from Mauritius, has similar zoœcial avicularia: also *Lepralia edax* has vicarious avicularia. The solid masses and the irregular, sometimes erect, form of the zoœcia would suggest *Cellepora*; but we see the same thing in other *Schizoporellæ*, and are thus shown how artificial the zoœcial characters of *Cellepora* were.

Loc. Manaar, coral-banks (*Th.*); Mediterranean, Busk Coll., Brit. Museum, 99.7.1.2366 (as *S. spiculifera*); Khor Dongola, dredged on dead coral, 3 fath., near Engineer Island (1). Mr. Crossland writes: "this green, incrusting species abounds on stones and old cables of the Elect. Tel. Co., Suakim"; and also says, "the neighbourhood of Engineer Island is characterised by this species" [Khor Dongonab].

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* Prod. Zool. Vict. dec. xiii. p. 109, pl. 128. fig. 2.
† Ann. Mag. Nat. Hist. ser. 6, vol. i. p. 76, pl. 7. fig. 4.

LEPRALIA, *Johnston.*

In considering the position of this genus, now used provisionally, some of the remarks will apply to other genera, for many of our difficulties of classification, both as regards species and genera, arise from ignoring the rule that a species or genus must have been SUFFICIENTLY DESCRIBED for it to be retained *.

Lepralia, in the first edition of Johnston's 'British Zoophytes,' comprised 7 species, which, according to present ideas, would stand under 4, or, according to some authors, 5 genera. In the second edition there are 37 species, now placed under 11 genera. Johnston, following the ideas of his time, based his genus on the species being incrusting, but now we know that this is an almost useless character in generic divisions. Hincks retained the name for a part of Johnston's genus, though basing it upon zoœcial characters.

I quite agree with what various authors have said, that it would have been more satisfactory if Hincks had taken a new name, especially as Johnston's first species, *Hippothoa hyalina,* did not fall into the new genus. We now recognise that from Hincks's genera *Lepralia*, *Schizoporella*, and *Cellepora* some species will have to be removed and new groups formed ; yet the major part of Hincks's *Lepralia* have the sides of the oral aperture more or less straight, or slightly curved with the proximal edge nearly straight, and with a lateral elongation at the side to which the muscles are attached. This has been called *Hippoporina* by Neviani ; but regarding this, further study is required, as the type of *Hippoporina* has an enlarged ovicelligerous zoœcium, whereas some others have an external ovicell.

As already stated, the first species, *Hippothoa hyalina,* did not fall into Hincks's genus, as it belonged to a genus previously created by Lamouroux ; and it has been suggested that as the so-called type has gone, we must turn to the second species, *Lepralia nitida*, and take it as the type, and now replace the name *Membraniporella* by *Lepralia* ; but this is surely repeating Hincks's mistake in a very exaggerated form, and causing confusion in several genera.

How impossible it is to retain these old names at all cost is shown when we consider what the genus *Cellularia* was made to include, at least 8 genera of Cheilostomata and one of Cyclostomata. The first species is a *Tubucellaria,* but the genus *Cellularia* has been used in a variety of ways and its spelling altered. When we study the generic diagnosis of the older zoologists, say even of careful zoologists like Pallas and Gray, we often find that absolutely no character of any value is given, and the attempt to put new wine in old bottles has proved entirely impossible, and is causing great confusion in the nomenclature of the Bryozoa. Some of the diagnoses have conveyed so little information, that to help ourselves out of a difficulty we instinctively look to see what was included; but then to take the first species, and say that is the type of a heterogeneous group incorrectly and insufficiently described, is not making for stability of classification. The rule that, if nothing is said to the contrary, the first species mentioned must be considered as the type, was not made so that, when an utterly inadequate diagnosis was given, yet we must of necessity retain this name for a genus, to be afterwards fully described, containing this species.

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* If a species is not recognisably described, then it is surely in the position of a manuscript species, and most workers coming upon a species only described in manuscript would adopt that name if there were no reason against so doing, but they are under no obligation to do so.

However, a little more patience is still required, and I would repeat that we must not be in too great a hurry over re-classification, although recognising that important changes must come, and future classification must include new characters, for useful ones will be found in the opercula, their shape, attachment, and muscles; in varying characters of the ovicell—whether it is closed by the operculum or not; in the position of the testes and ovaria; in the nature of the oral and avicularian glands; in the way in which the zoœcia are connected through the rosette-plates or pore-chambers; in the primary zoœcia: on the other hand, we have to recognise that Hincks attached far too much importance to peristomial characters. Thus, while recognising that changes will be made, present generic names and generic groupings can be provisionally used, and it is known that two or three competent workers are giving classification close attention, and in all probability we shall find that the present one gives us a useful basis, and that many known genera will be retained after removing species incorrectly placed in them.

Out of the genus *Lepralia* of Hincks, *Hippoporina*, *Cyclopora*, and *Monoporella* have been formed.

LEPRALIA JAPONICA, *Busk*. (Plate **13**. figs. 10–12.)

Lepralia japonica, Busk, Zool. Chall. Exp. vol. x. pt. xxx. p. 143, pl. 17. fig. 5; Waters, Zool. Chall. Exp. vol. xxxi. pt. lxxix. p. 26 (1889); Ortmann, "Japanische Bryozoenfauna," Arch. f. Naturgesch. vol. i. p. 39, pl. 1. fig. 11 (1890).

Semieschara magna, d'Orb. Pal. Franç. vol. v. p. 367 (1851). See Waters, Ann. Mag. Nat. Hist. ser. 7, vol. xv. (1905) p. 6.

Lepralia gigas, Hincks, Ann. Mag. Nat. Hist. ser. 5, vol. xv. (1885) p. 255, pl. 9. fig. 8; Kirkpatrick, Ann. Mag. Nat. Hist. ser. 6, vol. i. (1888) p. 78; Thornely, "Manaar," p. 120 (1905).

Lepralia gigantea, Busk MSS. Brit. Mus. Coll.

This occurs from the Sudan with unilaminate broad tubes (say 10 mm. diam.), which anastomose irregularly, forming a very large growth, for some pieces about 70 mm. across are evidently only fragments of large colonies.

There are about 25 tentacles. Only very few zoœcia containing polypides have been found, and these only in a very unsatisfactory condition; evidently good specimens are likely to reveal structures of interest.

The 'Challenger' specimens have a broad avicularium by the side of the aperture, but they were not abundant, and were overlooked by Busk; and, as mentioned in my 'Challenger' supplementary Report, the ovicell has very minute perforations. The ovicells are similar from all localities. The internal base of the ovicell has about three rows of large pores (fig. 10), and the lateral, distal, and basal walls of the zoœcia have moderate-sized pores evenly distributed over the surface. On the distal wall there may be about 10–15 pores. Sections show that two of the tentacles are larger than the others, extending beyond them, and having more large nuclei. This is the case in a large number of species.

Mr. Crossland notes that "large quantities of this Polyzoon * were trawled in the Bay of Agig Suraya (in the south part of the Sudan coast). The tubular branches are inhabited by a species of the Polychæte worm *Chœtopterus*, and afford habitat to a very large number and variety of small Polychæta; smaller crustacea are fewer."

Loc. Cobie, Japan, 8–50 fath. (*Chall.*); Sagamibai, Kadsiyama, slight depths, Maizuru, 35–40 fath., Japan (*Ortm.*); Island of Enoshima, near Yokohama (*Waters coll.*); Mauritius (*Kirkp.*); Trincomalee, as *L. gigas*, Hincks, and as *L. gigantea*, Busk, MSS., both specimens apparently received from Dr. Johnston (in Brit. Mus.); Gulf of Manaar (*Thornely*). Khor Dongola, on shells (2), off Skukak, 9 fath. (11), trawled in the Bay of Agig Suraya (21), Red Sea; Wasin, Brit. East Africa, 10 fath. (501), collected by Crossland.

LEPRALIA ? CUCULLATA, *Busk*. (Plate **15**. figs. 1–5, 10.)

Lepralia cucullata, Busk, Mar. Polyzoa, p. 81, pl. 96. figs. 4, 5 (1854); Heller, Verh. der k.-k. zool.-bot. Gesellsch. Wien, vol. xvii. (1867) p. 112; Manzoni, Bryozoi del Plioc. ant. di Castrocaro, p. 31, pl. 4. fig. 47 (1875); Waters, "Bry. of Naples," Ann. Mag. Nat. Hist. ser. 5, vol. iii. (1879) p. 40, pl. 10. fig. 4; "Use of the Opercula, &c.," Proc. Manch. Lit. & Phil. Soc. vol. xviii. (1878) pl. 1. fig. 14; Seguenza, "Formaz. Terz. nella Prov. di Reggio," R. Accad. dei Lincei, a. cclxxvii. ser. 3. vi. (1880) pp. 329, 370; Calvet, "Bry. Mar. de la Région de Cette," Inst. Zool. de l'Univ. de Montpellier, ser. 2, p. 52 (1902); "Bry. Mar. de Corse," *op. cit.* p. 27 (1902); Thornely, "Manaar," p. 120 (1905); Records of the Indian Mus. vol. i. pt. 3, no. 13, p. 190 (1907).

? *Cellepora ovoidea*, Audouin (*non* Lam. & Lamx.), 'Desc. de l'Égypte,' Hist. nat. vol. i. p. 238, pl. 8. fig. 1.

Lepralia atrofusca, Busk, J. Micr. Sc. vol. iv. (1856) p. 178.

Microporella Watersi, De Stefani, Jejo Mont e Capo Vat. p. 129 (1884).

Schizoporella atrofusca, Hincks, Ann. Mag. Nat. Hist. ser. 5, vol. xvii. p. 269, pl. 10. figs. 4, 5; also var. *labiosa*, Hincks, 1886.

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* This is the branching tubular form referred to by Crossland on p. 8 of this volume.

Smittia cucullata, Neviani, "Dei Bryoz. foss. Ital. 2ª, cont.," Boll. Soc. Geol. Ital. vol. xii. (1893) p. 125.

Smittia (subgenus *Watersipora*) *cucullata,* Neviani, "Brioz. foss. della Farnesina e Monte Mario," Paleont. Italica, vol. i. p. 120 (1895); "Brioz. Neog. delle Calabria," *op. cit.* vol. vi. p. 209 (1900).

There is considerable variation in the peristome, so that both in the Mediterranean and in the Atlantic the var. *labiosa*, so named independently by both Hincks and Calvet, is found, as well as the type.

Some of the Red Sea specimens have quite thin shells, whereas in those I have seen from Naples, Trieste, Rapallo, and Cape Verde the shell is thick, and in these the whole zoarium is very dark, whereas those from the Red Sea are much lighter; some are even without pigment, only the operculum being dark.

The operculum is very characteristic and does not vary in any of the forms; at the side there are the two lighter places in the very dark operculum, and the two small hollow knobs near the base are distinctly seen. These apparently act as stops when the operculum is open (figs. 2, 3), and then the operculum is bent back nearly at right angles. The ovaria grow at the side of the zoœcium, but the ovum passes for development into a sac at the distal end by the basal wall (fig. 4). This ovicell is what I have called a concealed ovicell.

There are about 23–24 tentacles, with two larger than the others.

No oral glands were found in the young or the mature zoœcia until the ovicell was forming; however, when the ovaria are becoming large, two bodies begin to grow from the fleshy mass on the operculum (fig. 10), and when the ova are in the ovicell these become moderate-sized glands. This misled me at first into believing that there were no glands, and possibly glands will be found in the fully mature zoœcia of other species where they have not yet been seen.

In specimens from Trieste there is a band of darkly pigmented cells all round the stomach. A band of dark cells is known to occur in other species, but I have never seen any so dark as these; although they have been called liver-cells, they should perhaps be termed pancreatic.

Loc. Ægean Seas (*Busk*), Adriatic, Naples, Trieste, Rapallo, Cette, Corsica, Mazatlan (*Busk*), Azores (*Calv.*), Manaar (*Thornely*), Galle and Cheduba (*Th.*), Arabian Sea (form *labiosa*), British Museum Coll.; "Cape St. Lucas," California, in British Museum, S. Africa (fide *Burrows*). Bottom of sailing-boat, Suez (16), s.s. 'Thyra,' Suez (9), Canal entrance, collected by Crossland; Ras el Millan, Sinai coast, collected by Hartmeyer; Cape Verde Islands, collected by Crossland.

Fossil. Miocene, Pliocene, and post-Pliocene, from various localities in Italy.

LEPRALIA ROBUSTA, *Hincks*. (Plate **13**. figs. 13, 14.)

Lepralia robusta, Hincks, Ann. Mag. Nat. Hist. ser. 5, vol. xiii. (1884) p. 360, pl. 13. fig. 4; Journ. Linn. Soc., Zool. vol. xxi. (1887) p. 131; Thornely, "Manaar," p. 119 (1905).

The pore alluded to by Hincks and Thornely, but not figured, is not seen in my specimens. There are, however, pores at the base of the avicularium which might sometimes appear to be below the oral aperture. The avicularium has a thin bar across, which is in parts broken away.

Loc. Mergui Archipelago (*Hincks*); Gulf of Manaar (*Thornely*); Khor Dongola (6), Sudan Exped., collected by Crossland.

LEPRALIA OCCLUSA (*Busk*). (Plate **13**. fig. 15; Plate **14**. figs. 1–9, 13.)

Escharoides occlusa, Busk, Zool. Chall. Exp. vol. x. pt. xxx. p. 150, pl. 21. fig. 8 (1884).

Lepralia occlusa, Waters, Zool. Chall. Exp. vol. xxxi. p. 26, pl. 3. figs. 32–34 (1889); Kirkpatrick, Proc. R. Dublin Soc. n. s. vol. vi. (1890) p. 612.

Zoarium much branched, about 50–70 mm. high; branches compressed.

There are vicarious avicularia having duck-billed shaped mandibles, spreading from a straight base (fig. 15). A 'Challenger' specimen, from Station 186, Cape York, has these avicularia, and they occur in the specimens from British East Africa. There is in the Sudan specimens a small semicircular avicularium at the proximal end of the zoœcium, and in the Zanzibar specimens there are, besides this, also other semicircular ones scattered over the zooecium.

Tentacles 17–19.

There is a large multilobular gland situated at the distal end, near to the basal wall. A lobe may be hollow in the middle or closed, and may contain a homogeneous mass of small yellowish particles which do not stain. In the gland there are frequently semitransparent slightly refractive masses which may have the edges, in part, more or less straight or angular, while these masses sometimes appear amorphous (fig. 8). This gland is nearly round, or contracted towards the middle to form two hemispheres. The single duct from the gland is directed upwards, that is towards the operculum; but shortly it divides into two, sometimes at the division expanding and forming two nearly globular organs (fig. 13), and the two tubes are continued to the diaphragm. These tubes or ducts have thick cellular walls (fig. 4), and the contents of the tubes are the same yellowish unstainable material, sometimes containing bodies with more or less straight edges, as just described in the lobes.

The gland, and sometimes the lobules, are surrounded by a membrane with nucleated cells (figs. 8, 9). The number of lobes is considerable, and may reach to at least thirty.

Although all points are not fully elucidated, these are undoubtedly the oral glands to which I have referred in various papers. These glands were described in one species by Ostrumoff[*] in a Russian paper, of which a French translation was given in the 'Archives Slaves de Biol.'[†], and were mentioned in my 'Challenger' Suppl. Report, as well as in a paper "On Gland-like Bodies in the Bryozoa"[‡], and in subsequent papers[§].

The oral glands are structures for which I have been on the look out for many years; but a large proportion of the specimens received are not in a suitable condition for such examination, so that although I have cut sections of hundreds of species, as much has not been learnt about them as I hoped. However, I am now in a position to state that the glands occur in a large number of species in very varying forms and sizes, but only, so far as we know, in what we may for simplicity call the calcareous forms, that is, in the *Escharina* of the older authors, being usually absent in the *Cellularidæ*, *Membraniporidæ*, *Flustradiæ*[‖], &c., though even here there are traces in some which are probably vestigial, as in *Bugula bicornis*, Busk, &c.

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[*] Obshchestvo Estestvoispuitatelei, Kazan, vol. xvi. p. 26, pl. 1. fig. 17 (1886).

[†] "Étude Zool. & Morph. des Bry.," Arch. Sl. de Biol. vol. i. (1886). (The translation omits the description of *Lepralia pallasiana.*)

[‡] Journ. Linn. Soc., Zool. vol. xxiv. (1892) p. 272, pl. 19.

[§] A large gland is figured in the description of *Retepora hippocrepis*, Waters, Voyage du S.Y. 'Belgica,' p. 85 (1904), and in *Rhamphostomella costata*, Lorenz, Journ. Linn. Soc., Zool. vol. xxviii. (1900) pl. 12. figs. 1, 2.

[‖] [Since this paper was read Dr. Levinsen has given me a most interesting piece of *Flustra abyssicola*, Sars. In each zooecium hanging from the centre of the opercular region there is one yellow sac with homogeneous contents in the upper part, and darker granular or cellular contents in the lower. This occurs in zoœcia with polypides, but is more conspicuous in older and empty zoœcia, and then at the base of this sac, surrounding the end, there are a number of large cells looking much like small ovarian cells. There are, however, ovaria in the same zoœcia. Dr. Levinsen also gave me a *Flustra* much like *F. carbasea*, E. & S., which has two long narrow bodies at the side of the zoœcium suspended by a distinct duct. In longitudinal sections it is found that in some cases there are in these bodies conical groups of cells directed inwards towards the lumen. Sometimes these cells only occur in patches, and the walls are thick and structureless, so that in some states the greater part of the body is homogeneous. Haddon figured similar bodies in what he called *F. carbasea* in his "Budding in Polyzoa," pl. 38. fig. 12, as *l. c.*, but he did not allude to them in the text.

From sections made, it seems that these bodies and those in *F. abyssicola* may be testes, and, as already stated, Jullien described a gland in *Cribrilina figularis* as a testis (see Mém. de la Soc. Zool. de France, i. p. 270, pl. 10. figs. 1, 2, 1888). I have for many years made vain efforts to obtain *C. figularis* in good condition for examination. In many species of Bryozoa glands have been found in zoœcia together with well-developed lateral testes, and it appears that oral glands may have different functions. Both species will be further studied and shortly figured, and it is to be hoped that they may help towards clearing up some of the difficulties.]

In *Reteporidæ* they appear to be quite constant and well developed large sacs; also in the holostomatous *Celleporidæ*, which should be separated as *Holoporella* *, they are very long and tubular, or even irregularly twisted (Pl. **16**. fig. 7). In *Smittia* they are apparently always found, being very minute sacs close up to the tentacular sheath (Pl. **15**. fig. 11). In *Lepralia* they occur well developed in some species, though not so large as in *Retepora*, and it is one of the characters which must be used in endeavouring to bring the three genera *Schizoporella*, *Lepralia*, and *Cellepora* into better order. In *Schizoporella* they occur in some species, but I have so far only found them in species which have no muscular attachment close to the border, while in those with the muscular dots nearer together, as in *S. unicornis*, they have not been found.

It will be seen that in a large number of species each gland is divided into two distinct parts, but the most highly developed of all is that of *Lepralia occlusa*, Busk; then we pass to those with a terminal sac, as in *Schizoporella sanguinea*, Norm.; next to those with only the one part, which may develop into long contorted tubes as in *Holoporella vermiformis*, nov. (Pl. **16**. fig. 7); or, finally, they may occur as only a pair of small globes, consisting of but few cells close to the tentacular sheath, as in *Smittia*. In *Cellepora caminata*, Waters, the glands are tubular, forming a lobe. This interesting species should be further studied in fresh material. The glands of *Lepralia eliminata*, Waters, are perhaps the most curious yet met with, and I therefore add figures (Pl. **14**. figs. 10, 11). At the end of the first tubular portion, and with only a slight attachment, there is a round globe which in sections is homogeneous or contains in parts, usually the upper part, stout rods or vermiform bodies. These rods may be seen in the upper portion of the duct or gland, and occasionally there seem to be traces of large cells in the globe. The glands of this species I am unable to understand.

In various species I have seen a few abnormal growths of a smaller gland attached to the larger one, as figured in my Suppl. 'Challenger' Report, pl. iii. fig. 15, but this structure is rare.

In the avicularia there are also glands in a large number of species, and I figured those of *Lepralia foliacea*, Ell. & Sol.† (figs. 1, 4, 5), and *Retepora cellulosa*, L.† (fig. 14). They also occur in the avicularia of *Lepralia margaritifera*, Q. & G., *L. clivosa*, Waters, *Microporella ciliata* var., *Smittia trispinosa*, Johnst., *Porella plana*, Hincks, *P. acutirostris*, Smitt, &c. The avicularian glands have also similar yellowish homogeneous contents, sometimes with semitransparent bodies with more or less straight edges, as in

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* In the 'Challenger' *Cellepora hastigera*, B., there are enormous glands extending nearly the length of the zoœcium, and again turned back about half this length, but the state of the Brit. Mus. slides does not permit of further study.

† Journ. Linn. Soc., Zool. vol. xxiv (1892) pl. 19. figs. 1, 4, 5, 14.

L. occlusa, and generally in the oral glands. Attention may be called to the fact that the glands, as a rule, occur in all the zoœcia, and are not dependent upon the sexual condition of the zoœcium, so that they do not seem to be connected with sexual processes. However, in *Lepralia cucullata*, Busk, which has a concealed ovicell (Pl. **15**. fig. 4), the glands only begin to grow when the ovicell is forming. In *L. occlusa* the gland is formed in the youngest zoœcia, when the polypide is quite immature, and it looks like a growth from the tentacular sheath.

There is no absolute proof as to the function of the glands, and some experiments I made many years ago on feeding with colours were not satisfactory, for the difficulties when dealing with opaque calcareous organisms are very great. Calvet [*], however, states that he has not found that the glands absorb colour. There has always seemed much to suggest their being excretory organs, and in animals without a circulatory system we must not expect any such organ to exactly resemble those where there is an active circulation, nor with such glands surrounded by a membrane must we take it for granted that colour would be absorbed in the same way. The position [†] and varying shape also suggest comparison with salivary glands of insects, worms, &c., but we are confronted by the fact that there are similar glands in the avicularia; now these have no digestive organs, whereas the salivary glands are supposed to have a digestive function.

I have induced my friend Mr. Henry Waddington, F.L.S., to grow some Bryozoa in his aquarium in order to study this organ in specimens in perfect condition, and perhaps with his success in keeping marine animals, and his skill in microscopical manipulation, he or we may be able to throw light on the function of the organ.

However, to return to what we definitely know. There is a secreting-gland, having very different forms in various species, which pours out the secretion close to the diaphragm, that is at the external opening. Should proof be found that these glands only remove waste products, then I suppose they must be called excretory.

Very minute excretory organs are known in *Loxosoma* and *Pedicellina*, and have been described by Nitsche, Hatschek, Joliet, Harmer, Föttinger, Ehlers, Prouho, Schulze, and Gustav Stiasny [‡], who have cleared up points which were still uncertain; also Cori and others have considered that excretory organs occur in the Phylactolæmata; there is, however, no similarity between these small organs and those of the Cheilostomata.

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[*] 'Bryozoaires Ectoproctes Marins,' p. 286 (1900).

[†] The similarity is perhaps not so great as appears at first sight, for the glands are not attached directly to the movable polypide, but to the zoœcium which contains it, and it should be remembered that what is called the diaphragm is really a sphincter.

[‡] "Beitrag zur Kenntniss des Exkretionsapparates der Entoprocta," Arbeit. zool. Inst. Wien, vol. xv. p. 183, pl. 1 (1905).

The genus *Escharoides* cannot be retained. Milne-Edwards gave the name for a "subgenus" of *Cellepora* for "espèces dont les cellules sont rangées sur un seul plan et sont libres ou du moins bien distinctes dans une grande partie de leur longueur." The species included are a most heterogeneous group, the first-named being *Cellepora ovoidea,* Lamx., a species so slightly described that we shall never be sure what was intended. Smitt and Busk took the name for species with an avicularium in the lip, though not in any way corresponding with any of the species mentioned by Milne-Edwards.

In all probability a new genus must be made for *L. occlusa* on account of the peculiar glands, but it is better to wait until the glands have been studied in various allied species.

Loc. Crozet Isl., 210 fath.; Cape York, 8 fath.; Samboangan, 10 fath. (*Chall.*); Torres Straits (*Kirkpatrick,* and also var. *areolata*, K.); Murray Island, Torres Straits, 15–20 fath. Wasin, Brit. East Africa, 10 fath. (501 & 520), Ras Osowamembe, Zanzibar Channel, 10 fath. (504), Bay of Agig Suraya, South Sudan Coast, trawled (21), collected by Crossland.

SMITTIA SPATHULATA, *MacGillivray.*

Smittia reticulata, var. *spathulata,* MacG. Trans. Roy. Soc. Vict. vol. xix. (1882) p. 135 (6), pl. 3. fig. 14.

Smittia reticulata, var., Hincks, Ann. Mag. Nat. Hist. ser. 5, vol. viii. (1881) p. 123, but not var. *spathulata,* Hincks, Ann. Mag. Nat. Hist. ser. 5, vol. xix. (1887) p. 304, pl. 9. fig. 3, which is my *S. reticulata,* var. *inæqualis.*

Smittia spathulata, Kirkpatrick, Proc. Roy. Dublin Soc. vol. vi. (1890) p. 619, pl. 17. fig. 1.

From Khor Dongola there is a specimen with the zoœcia placed very irregularly. The zoœcia have large pores round the border, a broad avicularium on one side usually directed downwards, the peristome raised on each side, and two supra-oral spines.

There are small round oral glands more or less attached to the tentacular sheath. The glands of *Smittia* are all small so far as my examination goes, though they are somewhat larger in the *S. Landsborovii* group than in the *reticulata* group. In appearance this is much like the *Cellepora Raigii,* Audouin, but there are pores round the border in these Red Sea specimens, and the avicularia usually are directed downwards, though with the irregular zoœcia it is often difficult to know to which zoœcium an avicularium belongs, in fact they often appear to be quite independent.

Loc. Bass Straits; Victoria; Murray Island, Torres Straits; Brit. E. Africa (520), Khor Dongola (2), collected by Crossland; Ras el Millan, collected by Hartmeyer.

SMITTIA MARMOREA (*Hincks*). (Plate **13**. fig. 9.)

Lepralia marmorea, Hincks, Ann. Mag. Nat. Hist. ser. 4, vol. xx. (1877) p. 214.
Smittia marmorea, Hincks, Brit. Mar. Polyzoa, p. 350, pl. 36. figs. 3–5.

There are only a few dried zoœcia as figured, and although it, at first glance, seems to be *Schizoporella*, the resemblance to Hincks's figure of *S. marmorea* is so close that it seems advisable to consider it as that species. The zoarium is incrusting, and the zoœcia are subovate, smooth, with a row of pores round the border; below the aperture, and a little to one side, there is an avicularium close up to the peristome. The peristome is much raised, but is sometimes wanting at the distal end, and may be wanting at the proximal. No lyrula is visible; but the peristome, the shape of the operculum, and other characters are similar to those in the *S. reticulata* group; however, the lyrula may be deeper down and so out of sight. The ovicell is unknown. Specimens like this occur from the Mediterranean and other places in the Red Sea, but none seen were in a satisfactory condition for study.

This may be the *Flustra Legentilii*, Audouin.

Loc. Suez (14), collected by Crossland.

SMITTIA EGYPTIACA, sp. nov. (Plate **15**. figs. 6, 9.)

The adnate zoarium has the zoœcia arranged radially and biserial—that is, the zoœcia are in two longitudinal rows side by side, and then on each side of the two rows there is a straight, very thick divisional wall (fig. 9).

I have described and figured a very similar structure in a fossil called *Cellepora biradiata*, Waters*. Zoœcia subquadrate, only slightly raised, distinctly separated, surrounded by a row of large pores, surface granular. Oral aperture with a broad lyrula, and at each side, higher than the aperture, a small triangular avicularium directed downwards. The operculum has a chitinous ridge, curved upwards on each side and nearly meeting towards the middle of the operculum (fig. 8). *S. obstructa*, Waters, and *S. tripora*, Waters, both have more or less of a ridge across the operculum. The ovicells are wide, raised, globular, perforated within an area.

S. egyptiaca is somewhat like *S. dentata*, Waters, from the Antarctic, but in the former the avicularia are placed higher and the lyrula is not dentate.

The Zanzibar specimens have the surface smooth to slightly granular.

Loc. Khor Dongola (19) and Engineer Island, collected by Crossland; Ras el Millan, Sinai Coast, collected by Hartmeyer; Wasin, Brit. East Africa (520), collected by Crossland.

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* Quart. Journ. Geol. Soc. vol. xli. (1885) p. 306, pl. 7. figs. 11, 12.

SMITTIA EGYPTIACA, var. HEROOPOLITA, nov. (Plate **15**. figs. 7, 8.)

This has the zooecia in a double row as in the type, and has the chitinous ridge on the operculum as in *S. egyptiaca*, nov., but the zooecia are small, the side of the aperture is more raised, and there are larger avicularia at the border of the ovicell and elsewhere. The specimens have ovicells to almost all the zooecia.

Loc. From buoy at the entrance of the Canal at Suez (14), collected by Crossland.

RHYNCHOZOON CORRUGATUM (*Thornely*). (Plate **12**. figs. 14–16.)

Rhyncopora corrugata, Thornely, "Manaar," p. 118, fig. 5.

Zoarium adnate. Zooecia lageniform, with large raised peristome, more elevated at the sides than elsewhere, and within it a small circular avicularium which, in dried specimens, sometimes looks like an irregular denticle. The surface of the zoarium is frequently covered with large nodules. The ovicell is recumbent, rather straight at the sides, with a large circular area at each side. The oral aperture is nearly round, with a wide "poster," and the operculum, which is of the *Lagenipora* type, has the muscular dots some distance from the border.

An imperfect dry specimen from a buoy at Suez was not understood until an undetermined specimen in better preservation from Suez Bay was found in the British Museum (Busk collection). After these specimens had been studied and figured, Miss Thornely kindly showed me her Manaar collection, and assisted me in the examination of the Liverpool University collection.

The nodules on the Manaar specimens are not so pronounced as those from the Red Sea, in fact are sometimes absent. The peristome is, however, raised in the same way, and there is sometimes an avicularium within the peristome ; the denticle may then be the end of the avicularian chamber; and in the Manaar specimen, even when no avicularium is visible, there is sometimes a tube by the wall of the peristome, as if leading to an avicularian chamber.

The zooecia of specimens from the buoy are larger than those in the British Museum, and from the variation in the secondary aperture I have a suspicion that *R. corrugatum* and *R. incisor*, Thornely, may be found to be the same species. I did not see any *R. incisor* in Liverpool with ovicells.

Loc. Gulf of Manaar (*Thornely*) ; buoy at the entrance of the Suez Canal (14), Crossland collection ; Suez Bay (Busk coll.), British Museum, 99.7.1.2012.

LAGENIPORA COSTAZII (*Audouin*), var. SPATHULATA, *MacGillivray*.

Cellepora Costazii, var. *spathulata*, MacG. Prod. Zool. of Victoria, dec. xv. p. 185, pl. 148. fig. 6.

Zoarium pisiform. Zoœcium erect, ovate; peristome not much extended, with a triangular avicularium at one side. Operculum nearly round, with the muscular dots a distance from the borders. Only one vicarious avicularium has been found. Ovicell rather higher than is usual in *Lagenipora*, area perforated round the border.

There are 13 tentacles.

I believe that this is the *C. Costazii* var. for which MacGillivray suggested the name *spathulata*[*], though there is no mucro, neither does MacGillivray figure any. Also in some other species he speaks of a mucro where none is figured.

Neviani has made a genus *Costazia* [†], of which the *L. Costazii* is the type; but his *Costazia celleporina*, Nev. [‡], belongs to the holostomatous group, showing that the genus was not based upon satisfactory characters.

Lagenipora seems to be a very natural group, the opercula throughout being similar, and in most cases about the same size; also the ovicell at the side of the peristome has a flat area and pores round the border.

Loc. Dredged at Suez, among lamellibranchs covering the dock walls (no. 18).

HOLOPORELLA, gen. nov.

The lower lip of the aperture is more or less straight, the operculum has the muscles attached near the border, sometimes with a ridge [§] running inwards; the ovicell is a widely open cap. There are usually oral and vicarious avicularia, and the mandible of one of the two usually has a small projection from the base which Busk called the columella. Most species have an exceedingly minute avicularium at each side of the zoœcium, at the distal end, but in some they are no longer functional, only vestigial (Pl. **17**. figs. 22, 23); also the oral glands are long and tubular, sometimes irregularly folded. Many species are very dark, nearly black.

In 1879 I showed that the operculum of *Cellepora sardonica*, Waters, had a straight proximal edge; and Busk, in his 'Challenger' Report, makes a division (§ 1) of forms of *Cellepora* with a straight border to the oral aperture, and also said that the avicularian mandible usually had a short median columella, but that it was absent from *C. sardonica*, Waters, and that this structure seemed to be confined to species from the southern hemisphere. As I have since shown, *C. sardonica* has two kinds of avicularia, one of which has a columella, and it is curious how in other species the columella occurs for the most part in one of the two but not in both; however, it is perhaps more frequent in the vicarious avicularia than in the oral. There are a large number of species in the north and south tropics, in fact the holostomatous forms are much more largely represented in the tropics than the schizostomatous *Cellepora*.

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[*] Zool. of Victoria, dec. xv. p. 185, pl. 148. figs. 5, 6 (1887).

[†] "Bri. Neog. di alcune Loc. Ital." pt. ii., Boll. Soc. Romano per gli Studi Zool. vol. iv. p. 239 (15), 1895.

[‡] "Coral e Bri. Neog. di Sardegna," Boll. Soc. Geol. Ital. vol. xv. p. (24), 1896.

[§] The opercula of many Bryozoa have a ridge for the attachment of the tentacular sheath.

In 1888 MacGillivray *, speaking of the *Cellepora* as forming two groups—the Holostomata † and Schizostomata—separated *Schismopora* from *Cellepora*; but, as I have already indicated elsewhere, this was unfortunate, as all the species which we have long known as *Cellepora*, including what we may call the types, were thereby removed from *Cellepora*, and this new division, the Holostomata, remained under *Cellepora*.

It will be recognised from my description that what I propose to call *Holoporella* has various characters by which it is very distinctly separated from *Cellepora*; and already from the old *Cellepora* a number of species have been removed to *Lagenipora* and *Palmicellaria*, and others fall into *Osthimosia*, Jull., or *Schismopora*, MacG.

In these Red Sea collections there is one *Lagenipora*, but otherwise the Schizostomata group of the old *Cellepora* is unrepresented, which is strange considering how numerous they are in the Mediterranean, though we may still expect various species to be found in the Red Sea.

Where the mandible has a columella, then the lucida always seems placed higher up than when there is no columella.

Although the minute avicularia alluded to have not been mentioned previously, yet in various stages of development and frequency they occur in *C. albirostris*, Smitt; *C. apiculata*, Busk; *C. fusca*, Busk; *C. hastigera*, Busk; *C. honolulensis*, Busk; *C. aspera*, Busk; *C. jacksoniensis*, Busk; *C. tridenticulata*, Busk. We must be alive to the possibility of some of these being synonyms.

One species of *Holoporella* was, in a paper by Hincks, placed under both *Monoporella albicans*, Hincks, and *Schizoporella aperta*, Hincks, and is still quoted under these two names, although Hincks ‡ in a subsequent paper recognised their identity. An examination of the opercula would at once have shown that in spite of a different appearance of the specimens the structure was the same, and also that there was no relationship with *Schizoporella* *.

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* Prod. Zool. Vict. dec. xvii. p. 241 (1888).

† Ortmann in 1890, 'Japanische Bry.' pp. 15, 16, makes the subfamily Holostomata for *Lepralia*, *Smittia*, &c., and Schizostomata for *Schizoporella*, &c.

‡ Ann. Mag. Nat. Hist. ser. 6, vol. ix. (1893) p. 176.

The species of *Holoporella* known from the tropics are *H. aspera* (Busk); *H. albirostris* (Sm.); *H. aperta* (Hincks); *H. columnaris* (Busk); *H. discoidea* (Busk), and var. *frutetosa*, Kirkp.; *H. fusca* (Busk); *H. granulosa* (Hasw.); *H. fossa* (Hasw.); *H. imbellis* (Busk); *H. lævis* (Hasw.); *H. mamillata* (Busk); *H. speciosa* (MacG.); *H. simplex* (MacG.); *H. tridenticulata* (Busk); *H. samboangensis* (Busk); *H. turrita* (Sm.); *H. Descostilsii* (Aud.); *H. vermiformis*, nov.; *H. pigmentaria*, nov.

The diagnosis of *Monoporella*, Hincks, would apply to *Holoporella*, but *H. nodulifera* and *H. lepida* could not be united to *Holoporella*, so that a fuller diagnosis of *Monoporella* is required, as it is probably a good genus.

HOLOPORELLA APERTA (*Hincks*). (Plate **18**. figs. 20–23.)

Schizoporella aperta, Hincks, Ann. Mag. Nat. Hist. ser. 5, vol. ix. (1882) p. 89, pl. 5. fig. 3; *op. cit.* ser. 6, vol. xi. p. 176 (1893); Thornely, "Manaar," p. 114 (1905); Rec. of Indian Museum, vol. i. pt. 3, no. 13 (1907) p. 189.

Monoporella albicans, Hincks, Ann. Mag. Nat. Hist. ser. 5, vol. ix. (1882) p. 86, pl. 5. figs. 5 *a*, *b*; Waters, *op. cit.* ser. 7, vol. xv. p. 16; Thornely, "Manaar," p. 113 (1905).

Cellepora brunnea, Hincks, Ann. Mag. Nat. Hist. ser. 5, vol. xiii. (1884) p. 30; Journ. Linn. Soc., Zool. vol. xxi. (1887) p. 132.

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* As the examination of the opercula has so largely assisted in establishing this genus, it may be well for a moment to consider why it is, that the operculum furnishes such useful characters in classification, in fact far away the most useful. When in my paper "On the use of the Opercula, &c." (Proc. Manchester Lit. & Phil. Soc. vol. xviii. p. 8, pl. i., 1878), I first showed how they might be used, it was principally as indicating the shape ofthe oral aperture, which it is often difficult or impossible to examine, for the peristome may hide the aperture, or it may even be well inside the zoœcium, directed towards the distal end. In nearly all cases the amount of individual variation is extremely small, so that in a slide of 50 opercula there may be no apparent variation. The importance of noticing the position of the muscular attachment was alluded to, and this is a point that extended examination shows is of the first importance.

The operculum as it must now be studied, however, shows not only the size and shape of the aperture, but also the position of the muscles in the zoœcium; and it is influenced by the compensation-chamber, by whether it has to close the ovicell, and by the way in which the tentacular sheath is attached. The operculum is nearly always hinged to teeth or condyles at each side, and these are often indicated on the opercula, and, further, from the operculum grows the tentacle-sheath for the new bud. Thus the operculum alone bears the impress of many important zoœcial characters.

The mandibles also furnish some characters, but are extremely variable in size and are subject to great modifications, and we must not expect them to give as valuable information as the opercula. The positions of the muscles, lucida, and columella are, however, useful.

I may add that many species can be determined by means of decalcified sections alone, and as the anatomy is more studied it will be possible to determine a larger number in this way.

? *Schismopora cucullata*, Maplestone, "Lord Howe Island," Proc. Roy. Soc. Vict. n. s vol. xvii. (1905) p. 389, pl. 29. figs. 7, 8.

Cellepora albicans, Waters, Quart. Journ. Geol. Soc. vol. xxxviii. (1882) p. 512.

There is no true opercular sinus, but there are two wide denticles in the oral aperture, which sometimes nearly meet and are frequently unsymmetrical. The operculum is entire below, and in the same way "*Schizoporella*" *subsinuata*, Hincks, has a notch in the peristome without the operculum corresponding, and has therefore to be removed from *Schizoporella*. These teeth in the specimens from Ras el Millan are very pronounced (see Pl. **18**. fig. 20), but in those from the Bay of Agig they are small and only form a square notch. There are two or four tapering oral spines and a minute semicircular avicularium on a short rostrum below the aperture, the surface of the zoœcium is granular, and there is a row of pores round the border. There are large, erect, vicarious avicularia, and the mandible has the columella characteristic of the group. The ovicell is a wide open cap, also a generic character. The oral aperture is not so large as in most of the genus, and the operculum has the two ridges turning inwards as in *C. tuberculata*, Busk, *C. jacksoniensis*, Busk, *C. polymorpha*, var. *samboangensis*, Busk, *C. tridenticulata*, Busk, *C. atlantica*, MS. Busk.

There are about 17 tentacles.

It has been overlooked by some authors that Hincks, in 1893, said that he found on re-examination that the *Monoporella albicans*, Hincks, and *Schizoporella aperta*, Hincks, were synonyms.

Loc. Singapore or Philippines (*Hincks*), Andamans (*Th.*), Kalingapatam (*Th.*), Manaar (*Th.*). Ras Osowamembe, Zanzibar Channel (504). Red Sea; Bay of Agig Suraya (21), Khor Dongola (19), Khor Shinab, 10–12 fath. (3), Shukuk, 9 fath. (11), Suez (18), collected by Crossland; Ras el Millan, Sinai coast, and Gimsah Bay, collected by Hartmeyer. Cuba, d'Orbigny coll., Mus. d'Hist nat. Paris, 13782.

Fossil. Bairnsdale, Victoria (*Waters*).

HOLOPORELLA DESCOSTILSII (*Audouin*). (Plate **16**. figs. 1, 2, 3.)

Cellepora Descostilsii, Aud. "Expéd. de l'Égypte," Zool. p. 238, pl. 7. fig. 11; d'Orb. Paléont. Franç. vol. v. p. 401.

Zoarium formed of several layers. Zoœcia coarsely granular, with a few large pores visible in the younger zoœcia. The lower lip is much raised into a narrow ridge, as shown by Savigny.

The large vicarious avicularia stand up erect in many cases, as figured by Savigny, and the border is serrate. The lower edge of the operculum is straight, and the muscular attachments are high up close to the side. The denticle or condyle at each side of the oral aperture can sometimes be distinguished. There is, as a rule, no oral avicularium in the lip, though in looking over considerable pieces I have seen one or two. The mandible of the vicarious avicularium has the lucida low down, and there is no columella, which occurs in the mandibles of most species of *Holoporella*. The ovicell is a wide open cap (fig. 1), as usual in the genus. The small piece from Ras el Millan has two oral spines, and the oral glands are tubular and more or less contorted.

Loc. "Polyzoa from lamellibranch shells, 30.11.04. Dredged near the quay-wall, Suez" (18), collected by Crossland; Ras el Millan, Red Sea, collected by Hartmeyer.

HOLOPORELLA PIGMENTARIA, sp. nov. (Pl. **15**. figs. 16–19; Pl. **16**. figs. 9–16; Pl. **17**. figs. 22–23.)

The zoarium, formed by several layers of zoœcia, is irregularly mamillate; the surface is very dark or black, though sometimes the raised mamilla is white.

The zoœcia near the growing edge are horizontal, with pores round the border, and the rest of the coarsely granular or nodulated surface is imperforate. A rostrum projecting from the lower lip has a triangular avicularium. There are vicarious avicularia, serrate at the edge, having long spatulate mandibles without a columella. Besides the ordinary pores round the border of the zoœcium, there is a large one belonging to the two neighbouring zoœcia (Pl. **15**. fig. 16). In specimens from Ras el Millan there are also very minute avicularia by the side of the zoœcium (Pl. **17**. figs. 22, *av.*, 23); however, in various species of *Holoporella* these minute avicularia are only seen on a few of the zoœcia, while in others they are general.

There are 17 tentacles, and the glands are tubular, though not so long as in some other species.

This species is much like *Cellepora mamillata*, Busk, and it is separated from it with diffidence, but the operculum spreads out at the base, whereas in *C. mamillata* the operculum, prepared from the type, has the sides nearly straight.

The fact of the zoarium being mamillated is not of primary importance, as there are many species in which the zoœcia are in the same way arranged in regular heaps.

This is a dark species, and a further study of the pigment in *C. vermiformis*, Waters, *C. albirostris*, Smitt, &c., would be of considerable value.

The colour is caused by a quantity of light brown, round cells with minute nucleus near the border. These are found inside the zoœcium near the walls and sometimes a few close up to the tentacular sheath; then they fill the pore-tubes, and on the outer surface of the zoœcium spread from one pore-tube to another, gradually forming a thick layer over a good part of the surface of the zoœcium (Pl. **16**. fig. 16). On the front of the zoœcium the layer of pigment is situated immediately under the external membrane, and the pigment is also found in the avicularium. The appearance of these pigment-masses is much like that of a piece of old cork. It should not be forgotten that there is a membrane across the bottom and the top of the pore-tube, but yet these pigment-cells occur not only in the pore-tubes but also above and below them.

In the zoœcia without polypides the opercula have near the proximal border a slight projection (Pl. **16.** fig. 10), which is irregular and sometimes grows into a long tube. In one case this long tube has a round body at the end (fig. 12), in another there are projections at various points near the base of this tongue, and then the narrow tube is curled at the end (fig. 13), The commencement of this tongue is by two slight outgrowths of three or four cells ; thus at first it is paired.

We have here the commencement of the tentacular sheath, and Harmer* has described the budding polypide of *Flustra papyrea*, Pall., as derived from the two angles of the operculum. In *H. pigmentaria* I have only seen the one case of the earliest stage, but several where the commencement of the tentacular sheath can be recognised, and there are many with the various digitiform processes (fig. 11).

Similar growth occurs in other *Holoporellæ*; and in *Flustra membranaceo-truncata*, Sm., and *Lepralia lonchæa*, Busk, I have seen a tube identical with fig. 12 ; also in *Schizoporella polystomella*, Reuss, there is in some of the zoœcia a projection or round body by the operculum, which is seen in various stages and commences as a double excrescence. Of course we have to look for these growths in zoœcia where the original polypide has died down and where a fresh growth of polypides is commencing, showing the importance of examining the colonies in all conditions; for specimens which at first seem valueless on account of containing few or no polypides may give valuable information on several points. It is difficult to distinguish between the growing and the reverse or absorbing process, and further examination is here required before we can be quite certain of the interpretation.

Loc. Khor Dongola (2) on *Meleagrina margaritifera*, L., collected by Crossland ; Ras el Millan, collected by Hartmeyer ; Gimsah Bay, Gulf of Suez, cellected by Hartmeyer ; Djibouti (Golf de Badjourah), Récif de Marabout, Red Sea, collected by Mons. Ch. Gravier, who gave me a small piece.

HOLOPORELLA VERMIFORMIS, nov. (Plate **16.** figs. 4–8.)

Zoarium incrusting, darkly pigmented, forming several layers, recumbent at the edges. Zoœcia smooth, with large pores round the border. The base of the oral aperture forms a large arc, and the operculum becomes wider at the proximal edge ; on the lower lip to one side there is a small raised avicularium directed laterally and a peristomial fissure ; however, many of the zooecia have the lower lip entire, without any avicularia, but only a ridge, as in *H. Descostilsii*, Aud. Only a very few vicarious avicularia have been met with, and these have a large nearly semicircular mandible (fig. 5) without columella.

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* "Nature of Excretory Processes," Quart. Journ. Micros. Sc. 1891, p. 138.

There are columnar processes, usually at right angles to the base of the zoarium, or arising at the side of the zooecium, and they pass up from a lower layer of zooecia, though not through a large number of layers as in *H. columnaris*, Busk, nor are they as large.

The oral glands are long and contorted in various directions like a wriggling worm (fig. 7), and on this account the name *vermiformis* is given. The walls of these glands are rather thin, in most cases like the walls of the tentacular sheath, and are without any of the large cells found in the glands of *Schizoporella*, *Smittia*, &c., so that there is no appearance of secreting-cells. The contents of the tube are the yellowish material that we have seen elsewhere.

This is much like the *H. pertusa*, Smitt, but he gives the aperture as 0·31 mm. wide, whereas in the present species it is only about half that width.

However, in the small pieces from the Red Sea given to me by Professor Keller, there was, besides *H. pigmentaria*, nov., a form with large zooecia and large apertures, which seems to be the *H.* (*Cellepora*) *pertusa* of Smitt, although even here the operculum does not come up to the size given by Smitt, not being more than 0·26 mm. wide. There are very large semicircular avicularia directed inwards over the oral aperture (fig. 18), and also avicularia of various sizes, the mandibles of which have a well-marked columella (Pl. **16**. figs. 17–21).

Loc. From ship 'Fayoum' in Suez docks, 8 months (20).

BERLIN COLLECTION.

CANDA ARACHNOIDES, *Lamouroux*.

In the specimens examined from the Red Sea only two anterior avicularia were found, except those on the ovicells; but I [*] have already mentioned that in some Australian pieces no avicularia are found, whereas they are common in others. In its zoarial growth it so much resembles *C. retiformis*, Smitt, that we cannot always be sure which of the two some of the older authors had before them, though the characteristic scutum enables *C. retiformis* to be distinguished. The *C. retiformis* from Zanzibar has only a few anterior avicularia, and these are in the neighbourhood of the bifurcation, whereas Miss Philipps mentions them as general along the median line. Smitt did not find any, and in the Japan specimen there are but a few large avicularia with narrow mandibles, in this case also near the bifurcation.

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[*] Ann. Mag. Nat. Hist. ser. 5, vol. xx. p. 89.

Maplestone says 16 tentacles, and this is the number I find in the Red Sea specimens.

Loc. Australia; Tasmania; New Zealand; Timor; Brazil (fide *Philipps*), Enoshima, nr. Yokohama, Japan (*Waters coll.*); lat. 16° 45′ N., long. 40° 30′ W., collected by Löffler & Siemens; Gimsah Bay, Gulf of Suez, collected by Hartmeyer.

SCRUPOCELLARIA CERVICORNIS, *Busk.*

For synonyms see Miss Jelly's Catalogue, and add:—

Haswell, W. A., "Polyzoa from the Queensland Coast," Proc. Linn. Soc. N. S. Wales, vol. v. p. 37; Meissner, Jena Denk. vol. viii. p. 730; Thornely, "Manaar," p. 109; Records of Indian Mus. vol. i. pt. 3, no. 13, p. 181.

A specimen from Ras el Millan, Red Sea, has the outer spine cervicorn, or at least divided. This is also the case in a specimen from Lizard Island, Queensland, in my collection; on the other hand, in a specimen from Wasin, Brit. East Africa, there is a very stout spine on each side, and both are usually divided; the anterior and lateral avicularia are small, and the vibracular chambers are longer than in the Red Sea specimen. I do not find the lateral spines by the avicularium, to which Hincks alludes, and doubt whether the species he described was really *cervicornis.*

Loc. Cumberland Island (*Busk*); Victoria (*MacG.*); Queensland (*Hasw. & Wat.*); Gulf of Manaar (*Th.*); Florida, 7–17 fath.; Amboina (*Meissner*); Arabian Sea (*Brit. Mus.*); Ras el Millan, Sinai coast, Red Sea, collected by Hartmeyer; Wasin, Brit. East Africa (522), 20 fath., collected by Crossland.

MEMBRANIPORA TRIFOLIUM, form MINOR, *Hincks.*

Membranipora trifolium, form *minor,* Hincks, Ann. Mag. Nat. Hist. ser. 5, vol. vi. (1880) p. 87, pl. 11. fig. 6; *op. cit.* ser. 5, vol. xv. (1885) p. 255, pl. 8. fig. 7; Waters, *op. cit.* ser. 7, vol. xvii. (1906) p. 14.

Membranipora papillata, Busk, Zool. Chall. Exp. vol. x. pt. xxx. p. 66, pl. 33. fig. 1 (1884).

Loc. Bahia and Tahiti (*Hincks*); Philippine Islands (*Chall.*); Wanganui, Chatham Islands (*Waters*); Singapore (I saw a specimen in Jullien's collection); Um el Jerman, Gulf of Suez, Red Sea, collected by Hartmeyer.

MEMBRANIPORA ARAGOI (*Audouin*).

Flustra Aragoi, Aud. Descrip. de l'Égypte, Hist. nat. p. 240, pl. 10. fig. 1.
Reptescharella Aragoi, d'Orb. Pal. Franç. vol. v. p. 465.

There is a small piece from Gimsah Bay, but in a most unsatisfactory condition, which it has not been possible to clean or preserve properly. There are but few spines, which meet on the central line; they are broad and much flattened out horizontally. The lateral projections over the distal end of the aperture which Savigny figured could not be made out, but apparently the processes in *M. sceletos**, Busk, from Madeira are very similar. In *sceletos* the spines are compressed instead of being flat, but the two species are apparently related though distinct. Both have large zoœcia.

FARCIMIA OCULATA (*Busk*).

Nellia oculata, Busk, Brit. Mus. Cat. p. 18, pl. 64. fig. 6 & pl. 65 bis, fig. 4 (1852); Thornely, "Manaar," p. 110 (1905); Records of Indian Museum, vol. i. pt. 3, no. 13, p. 185 (1907).

Farcimia oculata, Waters, Ann. Mag. Nat. Hist. ser. 5, vol. xx. (1887) p. 92; MacGillivray, Tert. Poly. Vict. p. 50, pl. 6. figs. 6, 7 (1895).

Cellaria quadrilatera, d'Orb. Pal. Franç. vol. v. p. 29 (1850).

For other synonyms see Miss Jelly's Catalogue.

Miss Jelly in her Catalogue calls this *Farcimia tenella*, Lamk., but with this specific name I cannot agree, seeing that Lamarck only gave a very short description, which might be applied to several species or even genera, as, for instance, *Farcimia* (*Membranipora*) *articulata* †, Waters.

D'Orbigny in Pal. Franç. v. pp. 28, 29, mentions *Cellaria tenella*, Lamk., and also *C. quadrilatera*, d'Orb., and from examination of d'Orbigny's collection I have shown this last to be *F. oculata*, Busk.

There are about 12 tentacles in the Red Sea specimens.

Loc. Florida; off Bahia; Torres Straits; Bass's Straits; Queensland; Victoria; Cape Grenville; Heard Island; Crozet Island; Philippine Islands; Mergui Archipelago; Ceylon; Gaspar Str. and Andamans; lat. 15° N., long. 41° E., 18 fath., collected by Löffler & Siemens; Wasin, Brit. E. Africa, 10 fath.; Prison Island, Ras Osowamembe, and Moweni Bay, Zanzibar, 6 fath., collected by Crossland.

Fossil. Muddy Creek and Wauru Ponds (*Victoria*).

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* Waters, "Membraniporidæ," Journ. Linn. Soc., Zool. vol. xxvi. (1898) pl. 49. fig. 2-5.

† Quart. Journ. Geol. Soc. vol. xxxviii. p. 264, pl. 8. figs. 15, 16 (1882). This has since been called *appendiculata* by Hincks, and although he published a long note (Ann. Mag. Nat. Hist. ser. 6, vol. xi. p. 177) maintaining that I was not right in uniting the two species, yet it is clear that Hincks had not correctly appreciated the avicularium. What he figures is the side of the avicularian chamber, while the avicularian opening and mandible are very small, directed right and left of Hincks's figure. MacGillivray recently confirmed my view of the identity of the two species (Tert. Poly. of Victoria, p. 50, pl. 6. fig. 5).

CHAPERIA TROPICA, sp. nov. (Plate **17.** fig. 1.)

The area occupies about half the front of the zoœcium and the opesial aperture is straight below. At the proximal end of the zoœcium there is a large raised process, dividing at the end laterally in a cervicorn manner, and on the front of this process there is a triangular avicularium. The ovicell is broad, subimmersed.

This seems to belong to the *C. minax* group, and has some relationship with *C. umbonata*, but differs in having the avicularium on the front. It seems nearest allied to *C. cylindracea*, var. *protecta* *, Waters, from the Antarctic, but in that case the process has lateral branches.

Loc. Gimsah Bay, Red Sea, collected by Hartmeyer. Growing on stone.

MICROPORELLA MALUSII (*Audouin*).

See Miss Jelly's Catalogue and add:—

Reptoporina hexagona, d'Orb. Pal. Franç. vol. v. p. 444. See Waters, Ann. Mag. Nat. Hist. ser. 7, vol. xv. (1905) p. 8.

Although *M. Malusii*, Aud., is so widely distributed I have only come upon one piece in these collections.

Loc. Cosmopolitan. Um el Jerman, Gulf of Suez, on *Retepora jermanensis* nov.

Fossil. In the Tertiaries of Europe, Australia, and Patagonia.

SCHIZOPORELLA NIVEA, *Busk*. (Plate **17.** figs. 2–4.)

Schizoporella nivea, Busk, Zool. Chall. Exp. vol. x. pt. xxx. p. 163, pl. 17. fig. 1 (1884); Philipps, "Report on the Polyzoa from the Loyalty Islands, &c.," Willey's Zool. Results, pt. iv. p. 440 (1899); Thornely, "Manaar," p. 114 (1905); Rec. Indian Mus. vol. i. pt. 3, no. 13, p. 189 (1907).

The Red Sea specimens have two very small circular avicularia at the distal corners, and at one of the proximal corners a broad spathulate avicularium. It has not been thought that the presence of this spathulate avicularium necessitates making a new variety, though at one time it was decided to call it var. *millanensis*.

The operculum has the muscular attachments close to the border, and there are faint lines across it. The Red Sea and Manaar specimens have the opercula about one-third smaller than those collected by the 'Challenger.'

There is a specimen from Zanzibar, in many respects like the present, though there is a rostrum below the aperture, and the operculum is longer with a narrow poster. *S. nivea* in many respects is like *S. linearis*, var. *quincuncialis*, Hincks, Ann. Mag. Nat. Hist. ser. 5, vol. vii. p. 158, pl. ix. fig. 3.

* Résultats du Voy. du S.Y. 'Belgica,' Bryozoa, p. 34, pl. 2. fig. 3.

Loc. S. Africa, 150 fath. (*Chall.*); Noumea, New Caledonia (*Ph.*); Gulf of Manaar (*Th.*); Andamans (*Th.*); Ras el Millan, collected by Hartmeyer.

SCHIZOPORELLA MUCRONATA (*Smitt*).

Hippothoa mucronata, Smitt, 'Floridan Bryozoa,' p. 45, pl. 8. fig. 169.
Schizoporella mucronata, Waters, Ann. Mag. Nat. Hist. ser. 6, vol. iv. p. 10, pl. 2. fig. 9.

The specimen from the Red Sea entirely corresponds with the one I figured from New South Wales.

Loc. Florida (*Sm.*); Green Point, N. S. Wales; Um el Jerman, Gulf of Suez, collected by Hartmeyer.

SCHIZOPORELLA PES ANSERIS (*Smitt*).

Hippothoa pes anseris, Smitt, "Floridan Bryozoa," p. 43, pl. 7. figs. 159, 160.
Mastigophora Dutertrei, var. *pes anseris*, Kirkpatrick, Ann. Mag. Nat. Hist. ser. 6, vol. i. p. 77; Thornely, "Manaar," p. 117.
Schizoporella pes anseris, Waters, "Bry. from Madeira," Journ. R. Micr. Soc. (1899), p. 11, pl. 3. figs. 7, 8.

Mastigophora was separated from *Schizoporella* as having vibracula; but this species has avicularia, and therefore I retain it with *Schizoporella*, and it belongs to the *S. Cecilii*, Aud., group.

Loc. W. off Tortugas (*Sm.*); Madeira (*Wat.*); Mauritius (*Kirkp.*); 10 miles off Galle, 34 fath. (*Thornely*); Gimsah Bay, Gulf of Suez, and lat. 16° N., long. 41° W., collected by Hartmeyer.

SCHIZOPORELLA BERNARDII (*Savigny & Audouin*). (Plate **17**. figs. 7–9.)

Cellepora Bernardii, Savigny, Expéd. de l'Égypte, Zool. pl. 7. fig. 7; Audouin, Explication Sommaires Zool. p. 238, p. 64.
Schizoporella depressa, Philipps, "Polyzoa from the Loyalty Isles, &c.," Willey's Zool. Results, pt. iv. p. 445, pl. 42. figs. 6, 6 *a* (1899); (?) Thornely, "Manaar," p. 115.

The zoœcia are irregularly placed, more or less erect, and are ovate with broad radiating ribs. The oral aperture has a broad sinus. The operculum has the muscular attachments distant from the border. There is a small semicircular avicularium at each side of the aperture, and in the older zoœcia a raised ridge encloses a pit in which are the aperture and the avicularia. Occasionally there are one or two of the small avicularia on the distal border; there are a few vicarious avicularia, with duck-bill mandibles, scattered about. The ovicell is not very prominent, rather thrown back, fairly large, with large perforations. The ovicells were not known to Miss Philipps, and Miss Thornely described them as "smooth, hyaline, or ridged, and have an oval area on either side of them." It therefore seems that she must have had another species before her.

Although Savigny did not figure the small round avicularia, he otherwise gave a fair figure showing the ovicell, so that the species is recognisable. Nevertheless it has not been easy to decide which of the two names should be retained.

Loc. Lifu (*Ph.*) ; Gulf of Manaar? and off Mount Lavinia (*Th.*) ; Ras el Millan, collected by Hartmeyer.

GIGANTOPORA FENESTRATA (*Smitt*). (Plate **18.** figs. 17–19.)

Hippothoa fenestrata, Smitt, "Floridan Bryozoa," p. 47, pl. 6. fig. 142 (1872).

Gigantopora lyncoides, Ridley, Proc. Zool. Soc. London, 1881, p. 47, pl. 6. fig. 3; Kirkpatrick, Ann. Mag. Nat. Hist. ser. 6, vol. i. (1888) p. 77, pl. 7. fig. 5.

Porina ? columnata, Waters, "Foss. Chil. S.W. Vict.," Quart. Journ. Geol. Soc. vol. xxxvii. (1881) p. 334, pl. 18. fig. 88.

? *Porina tuberculosa*, Maplestone, Proc. Roy. Soc. Vict. n. s. vol. xv. (1902) p. 23, pl. 2. fig. 15.

Porina cribraria, MacGillivray, "Tert. Poly. Vict.," Trans. Roy. Soc. Vict. vol. iv. p. 104, pl. 14. fig. 25 (1895).

Gigantopora fenestrata, Thornely, "Manaar," p. 113 (1905).

The three genera *Gigantopora*, Ridley, *Gephyrophora*, Busk, and *Galeopsis*, Jullien & Calvet, are synonyms, and have been made for species in which two lateral avicularia arch over the oral aperture, forming a bridge and a round or elliptical opening below. However, we have avicularia making an arch in a similar way in *Microporella* and *Smittia*, and it is probably not a character of generic importance ; and, as Kirkpatrick and I have indicated, *Gigantopora* belongs to the Schizoporellidan group ; but when *Schizoporella* is rearranged it is not likely to remain under that genus, though it may be an open question whether it should for the time being be placed there.

The ovicell is but very little raised and decumbent by the peristome. In *G. polymorpha*, Busk, the position of the ovicell is not usually indicated. The operculum of the *G. fenestrata* is about the size of that of *G. polymorpha* and is straighter at the proximal edge. It is double, consisting of two similar separable membranes one over the other; but as there is only one small cylindrical specimen, I have not been able to make full examination.

G. fenestrata is closely related to the Italian Tertiary fossil *Porina ? duplicata* *, Reuss, which, however, has only an avicularium at one side—in fact, a large number of zoœcia have none, and when it exists it is more in the lip than is the case in the present species ; also the peristome in the fossil is more raised, and the ovicell is somewhat more distinct and narrower.

Loc. Florida, 17 fath. (*Sm.*) ; S.E. Brazil, 33 fath. (*Ridley*) ; Mauritius (*Kirkp.*) ; Red Sea, lat. 16° 45′ N., long. 40° 30′ W., 26 fath., collected by Löffler & Siemens ; Gulf of Manaar (*Th.*).

Fossil. Victoria, Australia.

* Waters, "North Italian Bryozoa," Quart. Journ. Geol. Soc. vol. xlvii. p. 25, pl. 3. fig. 14.

LEPRALIA MONTFERRANDI (*Audouin & Savigny*). (Plate **17**. figs. 15–18.)

Flustra Montferrandi, Aud. "Descript. de l'Égypte," Hist. nat. vol. i. p. 240, pl. 9. fig. 14.

Lepralia Mortoni, Haswell, "Polyzoa from Queensland Coast," Proc. Linn. Soc. N.S. Wales, vol. v. (1881) p. 40; Thornely, "Manaar," p. 119.

? *Lepralia obtusata*, Ortmann, "Die Japanische Bryozoen," Arch. f. Naturgesch. p. 41, pl. 3. fig. 13 (1890).

The zooecia are not much raised, and below the aperture there is a minute triangular avicularium. However, this in a few cases, both from the Red Sea and from Manaar, develops into a large spathulate avicularium. The operculum has a dark thick border, and the poster is formed of a large arc of a circle. The ovicell is closed by the operculum.

The margins of the aperture are not much raised, but there are specimens in the Manaar collections with a decidedly raised peristome and similar avicularia, though with large pores round the border of the zooecia instead of the uniform perforations. This form, which may have to receive another generic name, also occurs from New Zealand (A. W. W. coll.). It is scarcely necessary to say that *L. Montferrandi* is only placed provisionally with *Lepralia*, and it would fall under *Cribrella*, Jullien & Calvet, if we are to accept that genus as based upon satisfactory characters. It belongs to the *Lepralia galeata* group, but is much smaller than the species described from Chili in my 'Belgica' Antarctic Report, p. 48. Probably one or two genera with nearly round apertures will have to be separated from *Lepralia*.

This species I have from Japan; it has the size and shape of the operculum identically the same as in the Red Sea specimens, also those from Manaar are within a trifle the same size. The *Lepralia acuta*, Ort., *L. obtusata*, Ort., and *Schizoporella pellucida* *, Ort., all seem most closely related and require further study. The *Lepralia cribrosa*, Maplestone (fossil, Victoria, Australia), differs from *L. Montferrandi* in having an avicularium.

Loc. Holborn Island, Queensland; Enoshima Island, N. Yokohama, Japan (*A. W. W. coll.*); Gulf of Manaar; Trincomalee, East Cheval Paar (*Th.*); Ras el Millan, coll. by Hartmeyer.

LEPRALIA LONCHÆA, *Busk*.

Lepralia lonchæa, Busk, Zool. Chall. Exp. vol. x. pt. xxx. p. 146, woodcut, fig. 43 (1884); Waters, Zool. Chall. Exp. vol. xxxi. pt. lxxix. p. 28 (1889); Kirkpatrick, Ann. Mag. Nat. Hist. ser. 6, vol. v. (1890) p. 19.

Lepralia vestita, Hincks, Ann. Mag. Nat. Hist. ser. 5, vol. xv. (1885) p. 256, pl. 9. fig. 9; Waters, *op. cit.* ser. 5, vol. xx. (1887) p. 194, pl. 6. fig. 21, & ser. 6, vol. iv. (1889) p. 12, pl. 1. fig. 20.

This was first described by Busk in the 'Challenger' Report without figures, except of the operculum and mandible. In my supplementary Report

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* There is *S. pellucida* of MacGillivray.

I said this was probably *vestita*, Hincks, but material was not available to speak with certainty, though since then Kirkpatrick has stated that examination proves them to be identical. There is strong probability that this is *Cellepora Mangnevilla* of Audouin-Savigny; but we cannot be absolutely sure, though the avicularia stand up against the peristome, which in one case is shown expanded. The name, however, was wrongly used, as it certainly is not the *Cellepora Mangnevillana* of Lamouroux. On this account d'Orbigny[*] gave Audouin's species a new name—*Audouinii*; therefore Busk was wrong when he called a Madeira form *Mangnevilla*, as he should have said *Audouinii*; but since then I have shown that this Madeira species was not the one described by Audouin, and have called it *Lepralia peristomata*[†], the oral aperture of which is about half the size of that of *L. lonchæa*. Smitt has also described from Florida a *Lepralia* as *L. Audouinii*, d'Orb.[‡], and here the size of the aperture is about the same as that of *L. lonchæa*. There is, however, no peristomial elevation or avicularia and the ovicell is somewhat different, but it closely resembles what I have called *L. vestita*, var. *australis*.

The Red Sea specimens are similar in size and in other respects to those from Tahiti described by Hincks. There is a round opening in the membrane under the mandible.

Loc. Admiralty Island, lat. 2° 0′ S., long. 147° 20′ E. (*Busk*); Tahiti, Fiji (*Hincks*); Tizard Reef, China Seas (*Kirkp.*); Ras el Millan, Sinai Coast, collected by Hartmeyer.

LEPRALIA. (Plate **17**. fig. 21.)

The figure shows the primary zoœcia of a *Lepralia* which cannot at present be determined, *though*, as the three primary zoœcia occurring together in this way is unusual, it will probably be identified on some future occasion.

Loc. Ras el Millan, on *Thalamoporella*.

LAGENIPORA ? TUBERCULATA, *MacGillivray*.

Lagenipora tuberculata, MacG. Prod. Zool. Vict. dec. xvi. p. 209, pl. 156. figs. 1, 2.

The small specimen is not well preserved and is difficult to study, but the "verruco-spinous" surface is similar to that of *L. tuberculata*, MacG., and *Anarthropora horrida*, Kirkp., from Mauritius. The pores on the surface have a protecting projection over one side. These, however, do not occur on all the pores in the Red Sea specimen, and are not so large as in those from Australia. In some British Museum specimens the projection is often acuminate at the end, reminding us of the peristome of *Lichenopora*: sometimes these are thin like the point of a knife, in others they are much more solid, though not forming a continuous tube. This Red Sea form is closely allied to the *Anarthropora horrida*, Kirkp.; but in that species the zooecia are smaller, the pores are more numerous, and there is a narrow lateral avicularium. Both belong to the same genus, but the material is not sufficient for a discussion of this point. *Lagenipora*, as I now understand it, has an ovicell below the peristome, with a flat perforated area. However, in the species now mentioned the ovicells are unknown, so that we can only leave it provisionally under *Lagenipora*, to await further examination.

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[*] Pal. Franç. vol. v. p. 401 (1850–52).

[†] Journ. Roy. Micr. Soc. 1899, p. 10, pl. 3. fig. 20.

[‡] 'Floridan Bryozoa,' p. 56, pl. 11. fig. 211 (1873).

Loc. Victoria (*MacG.*); Gimsah Bay, collected by Hartmeyer.

SMITTIA NITIDA (*Verrill*). (Plate **17**. figs. 19, 20.)

[*Discopora nitida*, Verrill, Amer. Journ. Sc. ix. (1875) p. 415, pl. 7. fig. 3.

There has been some confusion over *S. nitida*, V., and several of us must plead guilty to an undue tendency to make varieties round a few species, before various characters were sufficiently understood. In the British Museum there are some good specimens sent by Verrill as *nitida*, though some other species, some of which were not even *Smittia*, had been inadvertently included. It has the square cells as figured by Verrill, a nearly round oral aperture, with a peristome somewhat raised at each side, two oral spines, and either a small avicularium rounded and expanded at the extremity, or in some zoœcia a stout triangular avicularium also directed downwards. Some specimens examined since fig. 19 was drawn have ovicells which are large and raised, with a central area in which are large pores—that is, they are of the *trispinosa* type, being much like those shown on Pl. **17**. fig. 5.

Loc. Long Island Sound (*Verrill*); Ras el Millan, collected by Hartmeyer; and lat. 16° N., long. 41° W., 30 fath., collected by Löffler & Siemens.

SMITTIA TRISPINOSA, var. PROTECTA, *Thornely*. (Plate **17**. figs. 5, 6.)

Smittia trispinosa, var. *protecta*, Thornely, "Manaar," p. 123 (1905).

Smittia nitida, Hincks, Ann. Mag. Nat. Hist. ser. 5, vol. vii. (1881) p. 159, pl. 9. fig. 5.

The zoœcia in the Red Sea specimens are arranged fairly regularly, not heaped. There are two spines above the oral aperture, and the ovicells are large, wide, raised, with but a rather small area perforated by irregular pores, which are often large. In the Red Sea specimens the large duck-bill avicularia are not common, and are much smaller than those in the specimens from Manaar. These avicularia are the more highly-developed equivalent of the small blunt avicularia, and in these large avicularia the round submandibular portion and the mandibular part are in quite different planes. The mandible is divided at the end into three or four points.

Loc. Gulf of Manaar (*Th.*) ; Ras el Millan, collected by Hartmeyer.

SMITTIA TROPICA, sp. nov. (Plate **17.** figs. 10–14.)

Zoarium white, incrusting. The zoœcia are distinctly separated, and there are pores at each side of the nearly straight borders. The surface is nodulated, and there are two oral spines. The peristome is much raised, sometimes dentate, but always with two internal ridges passing down the peristome and terminating in cardellæ. There is at one or both sides near the aperture an avicularium directed downwards. In most cases the avicularium is linear to oblong, with a thin transparent mandible (fig. 12) ; in other cases there is a somewhat larger avicularium, beaked at each side, and these larger triangular avicularia have a dark thick acute mandible (fig. 11), and here the muscles are four or five times as large as those of the first mentioned thin linear avicularia. In the narrow avicularia there is an opening on each side of the bar as usual, but there is also a small round opening further removed distally from the bar (fig. 14). The distal end of the avicularium means the beak end.

The ovicell is small, globular, thrown back, perforated, and closed by an ovicellular operculum (fig. 13, *o.o.*), which is semicircular and about half the size of the oral operculum. The ovicell is formed by two layers, and pore-tubes pass from one to the other (fig. 13). There are minute oral glands and 13 tentacles.

This very probably is the *Smittia trispinosa* form *spathulata*, Hincks *, but it is not the *spathulata* of MacGillivray.

Loc. Ras el Millan, collected by Hartmeyer.

LAGENIPORA COSTAZII (*Audouin*).

Cellepora Costazii, Aud. "Descrip. de l'Égypte," p. 237, pl. 7. fig. 4.

There is a small specimen in poor condition from Gimsah Bay, in which no ovicells or avicularia are preserved. It, however, seems to correspond with some British and Mediterranean specimens.

[In consequence of the remark of a friend, I have again examined the British Museum specimens of *Lagenipora socialis*, Hincks, and the collections of Hincks and Busk have been added since I first wrote on the group. The type-specimen of Hincks shows three ovicells, which are situated at the back, that is the neural wall of the tubular peristome. The peristome is raised above the ovicell, and there is a distinct area on the ovicell with some pores, but these are not readily made out. A specimen in my collection from Hastings, sent to me by Miss Jelly, and therefore to be considered as a co-type, has one such ovicell. It is therefore now quite clear that I was right in removing from *Cellepora* to *Lagenipora* a group with this form of ovicell; and *Lagenipora* must include *Cellepora Costazii*, Aud., *C. granum*, Hincks, &c. This is dealt with in my paper on Bryozoa from Madeira, Journ. R. Micr. Soc. 1899, p. 13.—16*th October*, 1908. A. W. W.]

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* Ann. Mag. Nat. Hist. ser. 5, vol. xix. p. 304, pl. 9. fig. 3.

RETEPORA HIRSUTA, *Busk*. (Plate **18.** figs. 24–26.)

Retepora hirsuta, Busk, Zool. Chall. Exp. vol. x. pt. xxx. p. 119, pl. 26. fig. 4 & woodcut, fig. 29 (1884).

The zoarium is more or less cup- or perhaps saucer-shaped; the fenestra are small, about the width of the branches. The zoœcia are distinct, with smooth surface and a few pores at the side. The peristome rises at the sides, and sometimes quite meets, forming a pore. In one or two cases there is an avicularium in the peristome, but this is rare, and it is also very rare to find any small avicularia on the anterior surface. Busk figures numerous avicularia, but they do not occur in my 'Challenger' specimen. The oral aperture has a small sinus, but a corresponding projection is not found on the operculum, as the sinus is formed by the double ridge within the peristome, to which I have referred as occurring in various *Reteporæ* and some *Smittiæ*.

There are some avicularia in the fenestræ, and sometimes also on the anterior wall of the zoœcium, in which the end is divided and raised. This kind of bifid avicularium is frequent in the *monilifera*-group.

The spines are thin and smooth, and this is also usually the case in the 'Challenger' specimen already referred to, though in that they are sometimes much stouter; and also in the specimen mentioned there are only two oral spines, whereas Busk gives five. However, in my 'Challenger' specimen although most of the spines are smooth, one is antenniform as described by Busk, who considered it as characteristic of the species. Thus we see what a difficult section of *Retepora* this is, as many of the characters are only seen in isolated cases. The ovicell is of the *monilifera* type with the stigma very wide, both in the median and curved lower portion, and there is sometimes a small semicircular avicularium near the distal end of the ovicell. There are 11 tentacles.

This species is very much like *R. monilifera*, var. *umbonata*, MacG., and perhaps that name should be used. The Australian specimens of var. *umbonata* are much stouter, and have semicircular or ovate avicularia surrounding the fenestræ as well as the bifid form.

Loc. Cape York, Torres Straits, Stat. 186 (*Chall.*); Red Sea, lat. 16° N., long. 41° W., 30 fath., collected by Löffler & Siemens; Zanzibar (*Crossland*).

RETEPORA ABYSSINICA, sp. nov. (Plate **18.** figs. 1–10.)

Zoarium branched in one plane, not reticulated, branches thick. The size of the zoarium may exceed 40 mm. The central zoœcia have large avicularia on a raised chamber, and with the end raised and sometimes bifid, directed laterally or downwards. The mandibles are broadly triangular (fig. 5). The labial pore is distinct and the fissure is well-marked. The ovicells are cucullate, with a slit in a thinner median part of the ovicell; and the ovicell-wall is prolonged downwards into the oral aperture by a subtruncate lamina, looking just like a uvula, and this structure, which occurs in some other species, is referred to in my paper on *Retepora*, Journ. Linn. Soc., Zool. vol. xxv. p. 260.

The dorsal surface has vibices, and in the area thus formed there is a long narrow avicularium with the mandible pointing downwards (fig. 6).

In the older part of the zoarium (fig. 9) the aperture is depressed, and there are stout vibices passing diagonally from aperture to aperture; the peristome has a suboral notch, and at the side of this there is a small avicularium which sometimes is circular, at others elongate and distinctly bifid at the end (fig. 10), but well within the aperture.

The are about 13 tentacles.

This species in general appearance so closely resembles *R. Solanderia* *, Risso, that at first it was taken for that species; but, besides other differences, the dorsal avicularia, instead of being directed diagonally upwards and having the same shaped mandibles as the anterior, are directed straight downwards and have a narrow mandible. Calvet † describes *R. Solanderia* from Corsica and figures the operculum, which differs entirely from that of the present form, and is similar to that of *Cellepora coronopus*, S. Woods, and so unlike the operculum of any *Retepora* as to be a considerable puzzle.

Thus *R. abyssinica* is much like the fossil *R. coriensis* of MacGillivray ‡, and there are points recalling *R. gigantea*, Busk, from which, however, it is distinct. It also is very closely allied to *R. marsupiata*, Smitt, and further material may possibly show that it should be called *marsupiata*.

Loc. Red Sea, lat. 16° N., long. 41° W., 30 fath., collected by Löffler & Siemens.

RETEPORA JERMANENSIS, sp. nov. (Plate **18.** figs. 11–16.)

Zoarium small, cup-shaped (15–20 mm. across), with very small fenestræ. The labial sinus is quite at one side, and in the lip there is a fairly large triangular avicularium, while about the middle of the surface of the zoœcium there is a small semicircular one. The surface is tubercular, the tubercles being very few, so that it cannot be called granular. The ovicell has a fissure in front, and the lamina extends into the oral aperture like a uvula, as already described in other species.

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* See Waters, Journ. Linn. Soc., Zool. vol. xxv. (1895) p. 264.

† "Bry. Marins des côtes de Corse," Trav. de l'Inst. de Zool. de l'Univ. de Montpellier, ser. 2, Mém. xii. p. 35, pl. 2. figs. 5–8.

‡ 'Tert. Polyzoa of Victoria,' p. 116, pl. 15. fig. 19.

On the dorsal surface there are numerous vibices with but few avicularia.

This is a much more delicate species than *R. granulata*, MacG., the branches not being half the width, with the tubercles more distinct, also the operculum is not so wide and the ovicell differs, having a projecting plate.

There are 11 tentacles.

Loc. Ras el Millan and Um el Jerman, Red Sea, collected by Hartmeyer; Prison Island, Zanzibar Channel (513), on the shore, collected by Crossland.

[At the last moment I have received from Mr. Crossland some shells of *Margaritifera vulgaris* collected at Khor Dongonab. Incrusting them is one colony of *Porella nitidissima*, Hincks, known from Madeira and Mauritius, also *Smittia trispinosa*, Johnst., not recorded previously; besides these, *Smittia egyptiaca*, Waters, *Thalamoporella Rozierii*, Aud., and *Ætea recta*, Hincks, are abundant.—10*th February*, 1909. A. W. W.]

EXPLANATION OF THE PLATES.

PLATE 10.

Fig. 1. *Vittaticella Contei*, Aud. Anterior surface, × 85. From Khor Dongola.
2. Do. do. Dorsal surface, × 85.
3. Do. do. Operculum, × 250.
4. Do. do. Natural size.
5. *Scrupocellaria Jolloisii*, Aud. Anterior surface, × 25. Suez, among corals.
6. Do. do. Dorsal surface, × 25.
7. Do. do. Mandible, × 85.
8. Do. do. Vibraculum, × 85.
9. Do. do. Natural size.
10. Do. do. Section showing dark bodies by the side of the zoœcium, × 50. From Ras el Millan.
11. *Scrupocellaria serrata*, sp. nov. Anterior surface showing avicularia by the side of the zoœcium, × 25. From Suez.
12. Do. do. × 25.
13. Do. do. Dorsal surface, × 85.
14. Do. do. Mandible, × 85.
15. *Scrupocellaria mansueta*, nov. × 25. (*a*) Avicularium, × 85. From Suez Bay.

PLATE 11.

Fig. 1. *Bugula neritina*, L. × 25. Showing the growth of the small fleshy mass at the inner side of the zoœcinm, and from this the gradual development of the ovicell. From Suez.
2. Do. do. Detached ovicell, × 50.
3. Do. do. Zoarium seen from the side, showing the ovicells. × 25.

Fig. 4. *Bugula neritina*, var. *minima*, nov. Dorsal surface, × 25. From Khor Dongola.
5. Do. do. Anterior surface, × 50.
6. Do. do. Anterior surface, × 50. From Nersa Makdah.
7. Do. do. Mandible, × 85.
8. *Membranipora Savartii*, Aud. Distal rosette-plates, × 25.
Figs. 9, 10. Do. do. Natural size. From Khor Dongola.
Fig. 11. Do. do. × 25. Young zoœcia. From Suakim.
12. Do. do. × 25. Older zoœcia showing small proximal denticles.
13. Do. do. × 25. From Red Sea, lat. 16° N., 41° W.

Plate 12.

Fig. 1. *Membranipora limosa*, sp. nov. Prepared with Eau de Javelle. × 25. From Khor Shinab (3).
2. Do. do. Natural size.
3. Do. do. × 12. Without the membrane being removed. Shows the thickened walls and elongate zoœcia at the bifurcation.
4. Do. do. Transverse section decalcified, × 12.
5. Do. do. Operculum, × 85.
6. *Microporella coronata*, Aud. × 50. From Suez Docks (20).
7. Do. do. × 25.
8. Do. do. Mandible, × 85.
9. Do. do. Operculum, × 85.
10. *Membranipora bursaria*, MacG. Operculum, × 85. From Engineer Island.
11. *Schizoporella unicornis*, var. × 25. Showing the diagonal position of the zoœcia. From s.s. 'Thyra' from the Mediterranean, docked in Suez (9).
12. *Schizoporella unicornis*, Johnst. Operculum, × 85.
13. Do. do. Mandible, × 85.
14. *Rhynchozoon corrugatum*, Thornely. × 85. From the Gulf of Suez, in the Busk Collection in the British Museum.
15. Do. do. × 25. From Suez Canal (14).
16. Do. do. Operculum, × 85.
17. *Schizoporella argentea*, Hincks. Mandible, × 85. From (2).
18. Do. do. Operculum, × 85.

Plate 13.

Fig. 1. *Schizoporella viridis*, Thornely. × 25. From Khor Dongola.
2. Do. do. × 25. Showing the zoœcia irregularly heaped, and one complete ovicell, also one in course of formation in which the two calcareous walls are distinguished.
3. Do. do. Oral aperture, × 85.
4. Do. do. Mandible of vicarious avicularium, × 85.
5. Do. do. Mandible of small avicularium, × 250; *a* × 85.
6. Do. do. Operculum, × 85.
7. Do. do. Aperture of the ovicell, × 85.
8. Do. do. Ovum in ovicell, × 85.
9. *Smittia marmorea*, Hincks. × 50. From Suez (14).
10. *Lepralia japonica*, Busk. Shows ovicells and one broken-down ovicell, × 25. From Shukuk.
11. Do. do. Mandible, × 85.
12. Do. do. Operculum, × 85.

Fig. 13. *Lepralia robusta*, Hincks. Mandible, × 85. From Khor Dongola.
14. Do. do. Operculum, × 85.
15. *Lepralia occlusa*, Busk. Mandible, × 85. From Suez.
igs. 16, 17. *Schizoporella argentea*, Hincks. × 85 & 25. From Khor Dongola.

PLATE 14.

Fig. 1. *Lepralia occlusa*, Busk. × 25. From Agig Suraya (21).
2. Do. do. × 50.
. Do. do. Transverse section showing the lobulated glands (*gl*) at the base of the zoœcium. (*op*) operculum, (*ts*) tentacles. × 85.
4. Do. do. Section of the duct or reservoir, × 250.
5. Do. do. Longitudinal section through the broader axis of the zoarium, showing the lobulated glands (*gl*) and the ducts in section in the lowest middle zœcium, × 85.
6. Do. do. Showing gland (*gl*) and reservoir (*r*), × 250. From Wasin, Brit. East Africa (501). The state of preservation of this was not entirely satisfactory.
7. Do. do. Longitudinal section cut through the shorter axis, showing the gland (*gl*), reservoir (*r*), diaphragm (*d*), operculum (*op*). × 85.
8. Do. do. Showing lobulated gland and the muscles by which it is attached, × 250.
9. Do. do. Longitudinal section through a lobulated gland, × 250.
10. *Lepralia eliminata*, Waters. Longitudinal section showing pair of glands, × 85.
11. Do. do. × 250.
12. *Cellepora caminata*, Waters. Tubular ramified gland, × 250.
13. *Lepralia occlusa*, Busk. Glands and ducts shown diagrammatically.
14. *Porella saccata*, Busk.* The interior of a portion in which there are no polypides, showing the glands reduced to two small globes attached to the fleshy tissue. × 85. From Franz Josef Land.

PLATE 15.

Fig. 1. *Lepralia cucullata*, Busk, × 50. From Suez (2).
2. Do. do. Section of aperture with (*op*) operculum open, (*sh*) front walls of zoœcium, (*t*) tentacles, (*ts*) tentacle-sheath, (*cs*) compensation sac, (*k*) knob on operculum. × 85. From Naples.
3. Do. do. Aperture with operculum nearly closed. (*d*) diaphragm. × 85. From Naples.
4. Do. do. Transverse section of a zoœcium near the distal end, showing the larva near the base of the zoœcium. × 85.
5. Do. do. Operculum, × 85.
6. *Smittia egyptiaca*, sp. nov., × 50. From Khor Dongola (19).
7. Do. do. var. *heteroopolita*, nov., × 50. From Suez (14).
8. Do. do. Operculum, × 85.
9. Do. do. Dorsal surface, showing the zoœcia in biserial rows, × about 10.
10. *Lepralia cucullata*, Busk. Commencement of glands growing on the operculum, × 250. From Suez.

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* This also shows the avicularian chamber, in which there are two very long muscles, and at the base there are the two characteristic pores. It would seem as if the avicularian chamber could take the place of a compensation-sac.

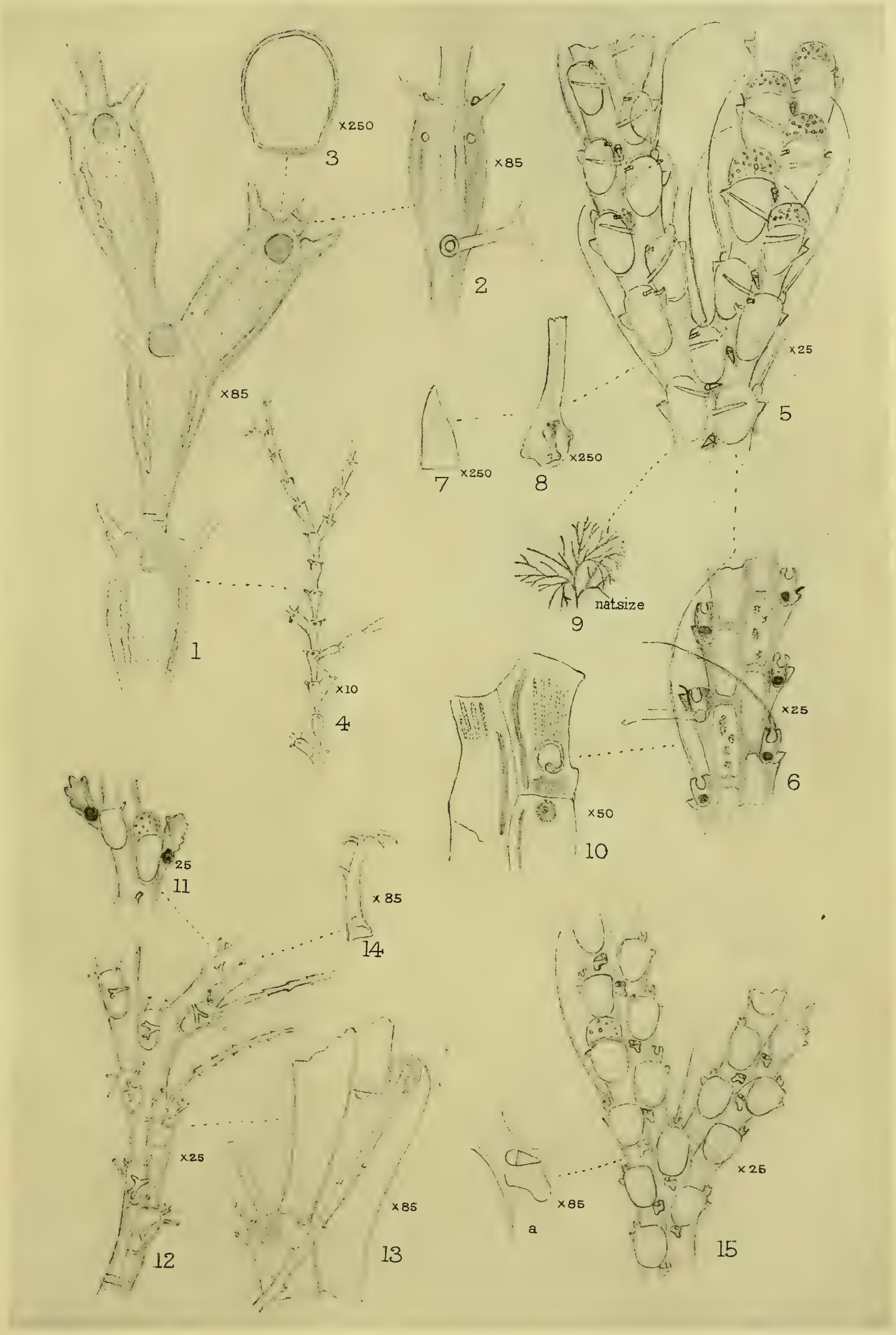
Fig. 11. *Smittia protecta*, Thornely. Polypide removed from the zoœcium, showing the small oral glands (*g*), the diaphragm (*d*), and the tentacles (*t*). × 85.
12. *Thalamoporella Rozierii*, Aud., × 25. From Ras el Millan.
13. Do. do. Vicarious avicularian chamber, × 50.
14. *Thalamoporella Rozierii*, Aud. Section of ovicell showing two larvæ, of which the right one is clearly older than the left.
15. Do. do. Mandible, × 85. From Ras el Millan.
16. *Holoporella pigmentaria*, sp. nov., × 85. From Khor Dongola.
17. Do. do. Operculum, × 85.
Figs. 18, 19. Do. do. Mandibles, × 250.

PLATE 16.

Fig. 1. *Holoporella Descostilsii*, Aud., × 50. (*ov*) ovicell. From Suez.
2. Do. do. Mandible, × 85.
3. Do. do. Operculum, × 85.
4. *Holoporella vermiformis*, sp. nov., × 50. From Suez (20).
5. Do. do. Mandibles, × 85.
6. Do. do. Operculum, × 85.
7. Do. do. Oral glands, × 85.
8. Do. do. Transverse section of oral gland, showing mesenchym-cells (*m*) on the wall of the sac and the homogeneous contents (*hc*) within the sac. × 50.
9. *Holoporella pigmentaria*, sp. nov., × 50. From Khor Dongola.
10. Do. do. Distal end of operculum; double outgrowth of cells to form tentacular sheath, × 300. From Khor Dongola.
11. Do. do. Distal end of operculum with digitiform process, × 300. From Khor Dongola.
12. Do. do. Distal end of operculum with tubular outgrowth and dark body at the end, × 300. From Ras el Millan.
13. Do. do. Operculum, showing the growth from the distal end, × 250. From Ras el Millan.
14. Do. do. Mass of cells causing the dark colour, × 25. From Khor Dongola.
15. Do. do. Cells more magnified.
16. Do. do. Showing how the brown-coloured mass spreads from the pore-tubes, first to the neighbouring ones and then over the whole of the front. × 50.
17. *Holoporella pertusa*, Smitt. Operculum, × 85. Red Sea.
Figs. 18, 19, 20, 21. Do. do. Mandibles, × 85.

PLATE 17.

Fig. 1. *Chaperia tropica*, sp. nov., × 25. From Gimsah Bay.
2. *Schizoporella nivea*, Busk. Mandible, × 85.
3. Do. do. Operculum, × 85.
4. Do. do. × 25. From Ras el Millan.
5. *Smittia trispinosa*, var. *protecta*, Thornely, × 25. From Ras el Millan.
6. Do. do. do. Mandible, × 85.
7. *Schizoporella Bernardii*, Sav. & Aud., × 25. From Ras el Millan.
8. Do. do. Operculum, × 85.
9 Do. do. Mandibles, × 250.
10. *Smittia tropica*, sp. nov., × 25. From Ras el Millan. Showing the two kinds of avicularia.



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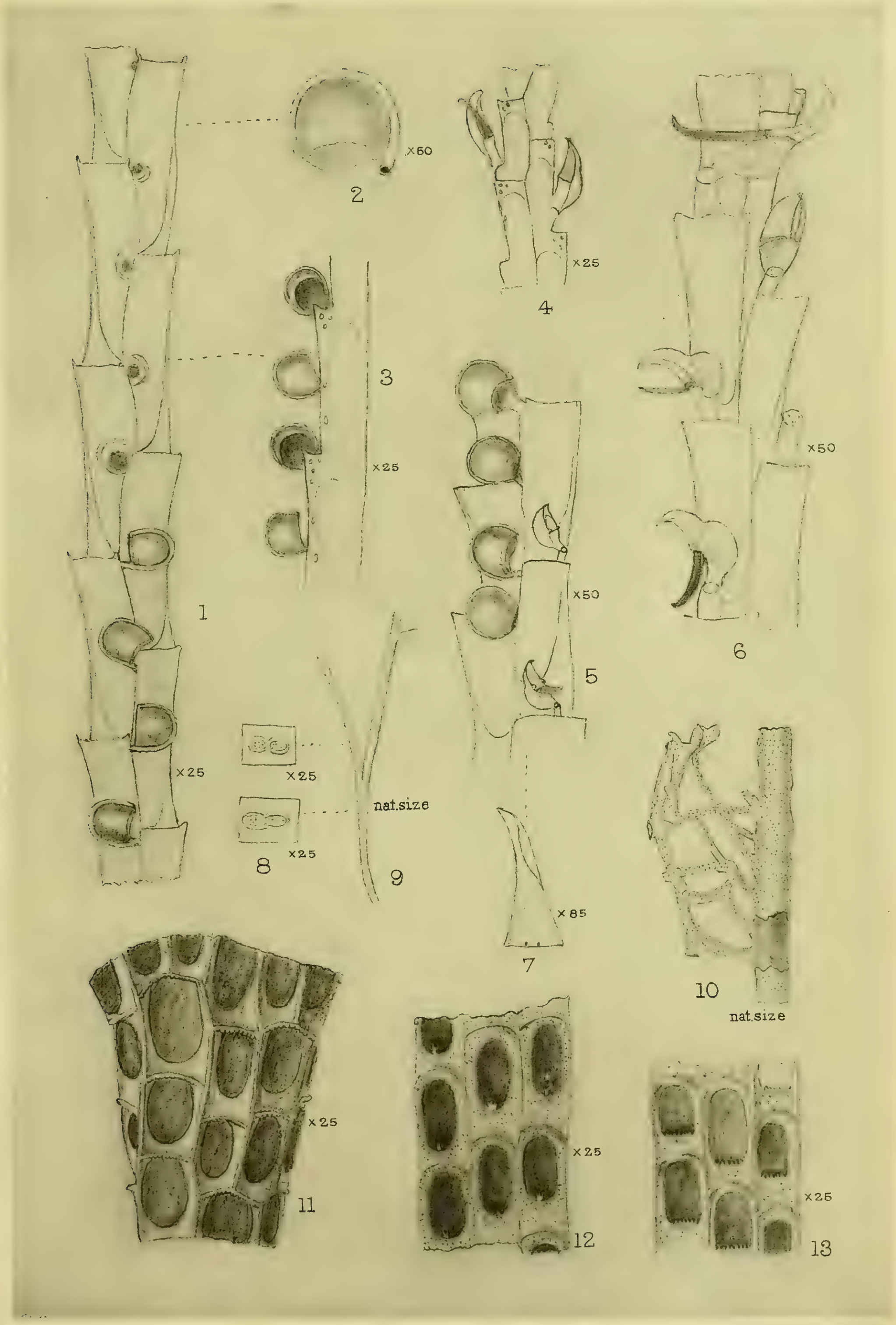
CHEILOSTOMATA FROM THE RED SEA.



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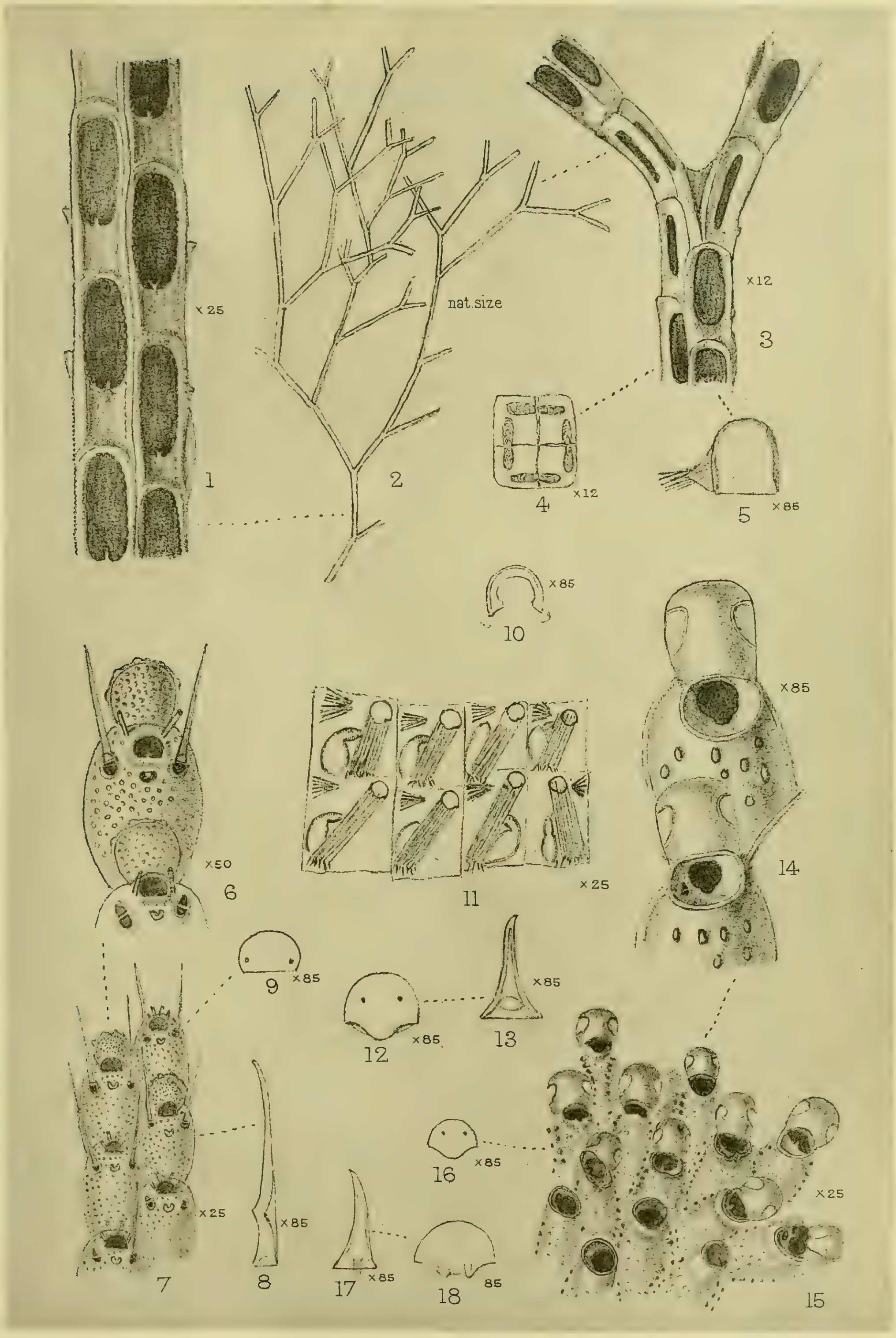

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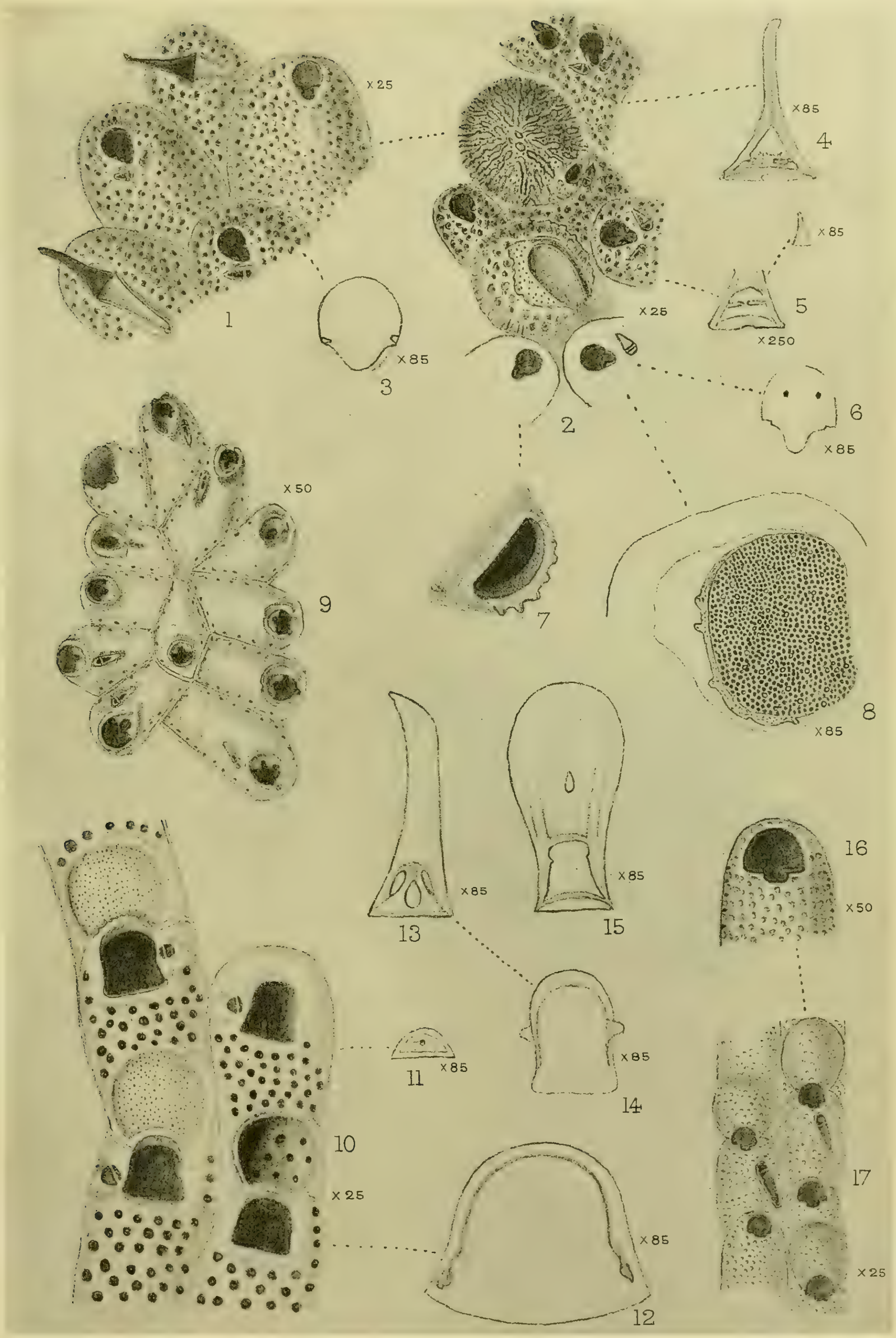

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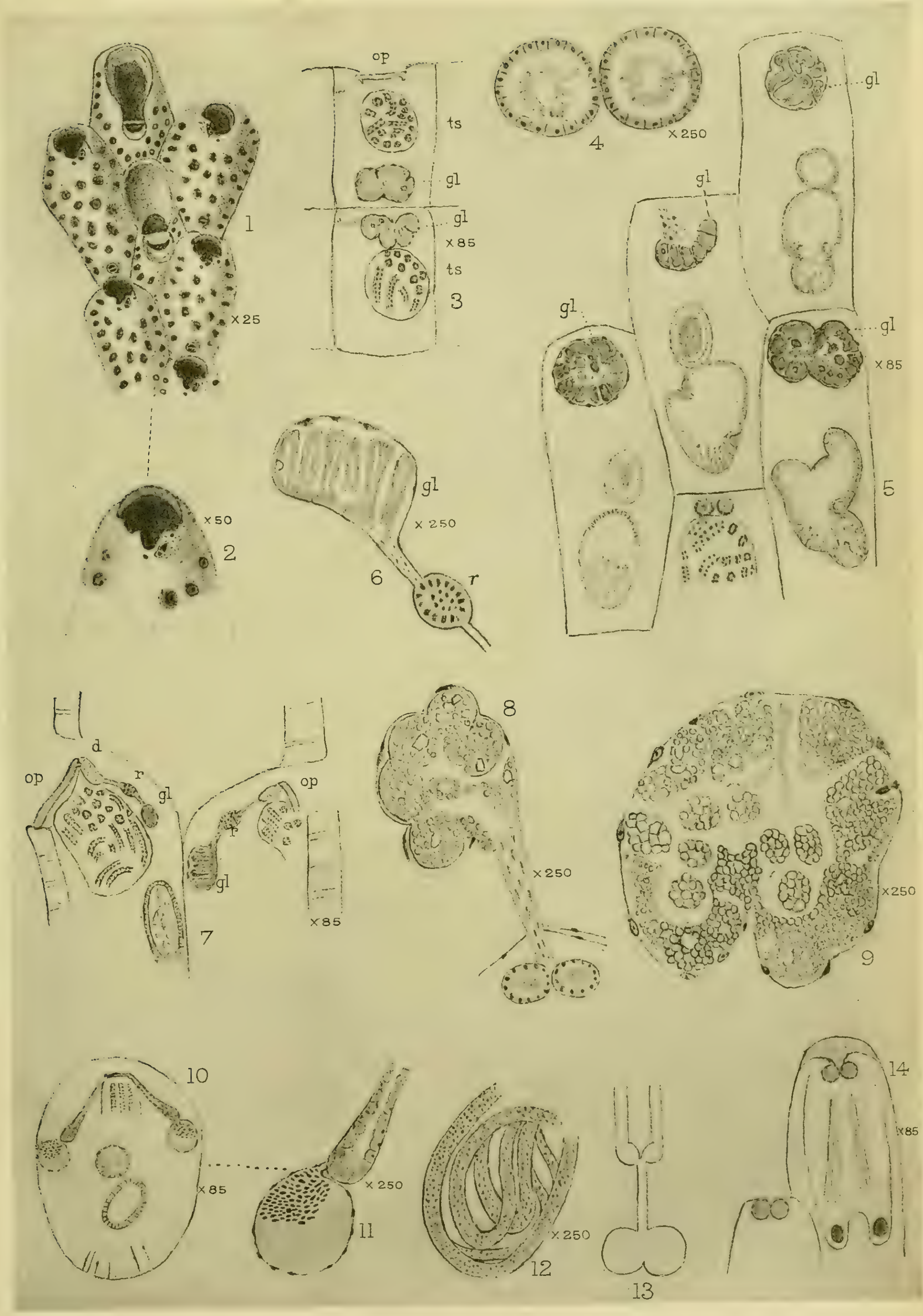

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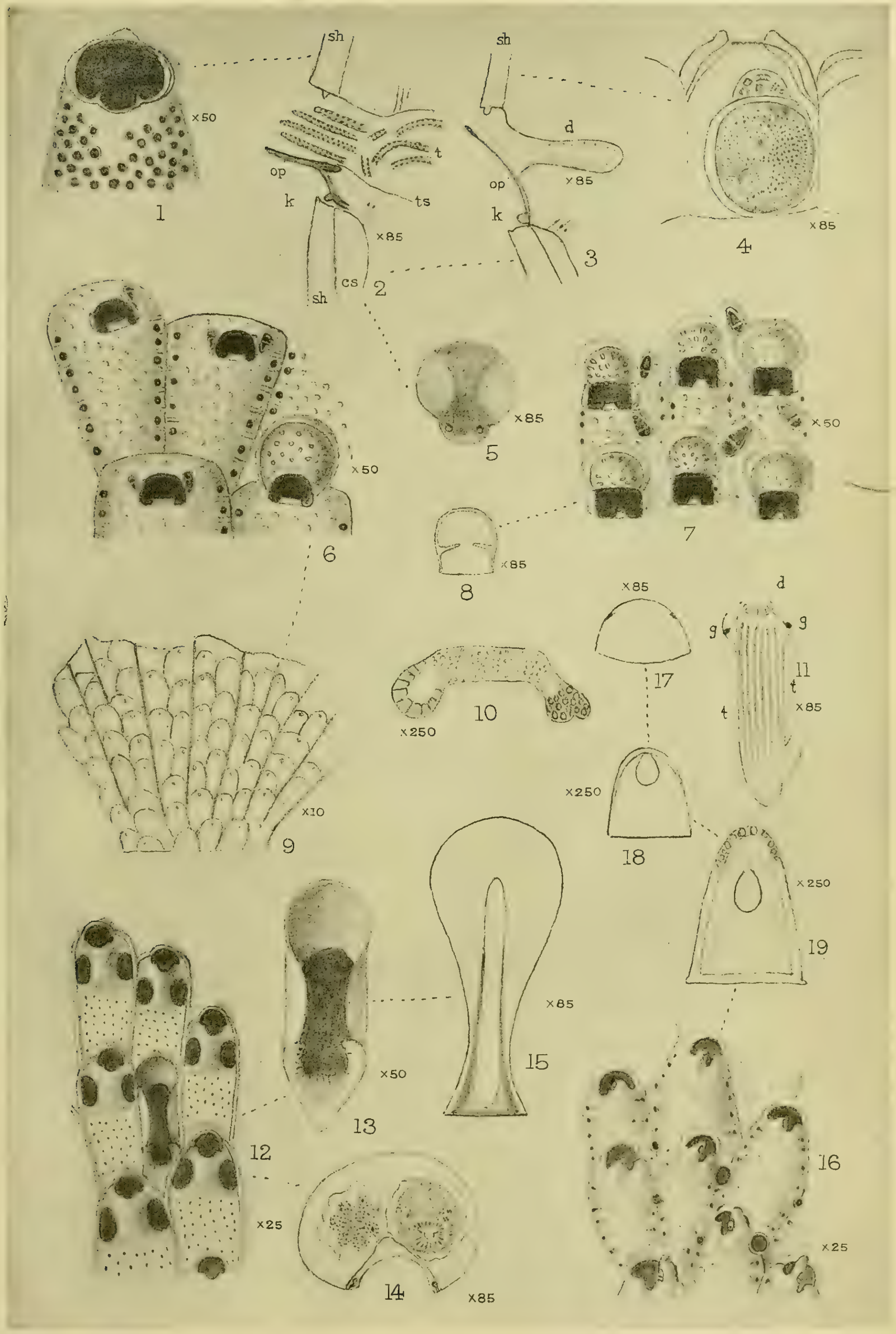

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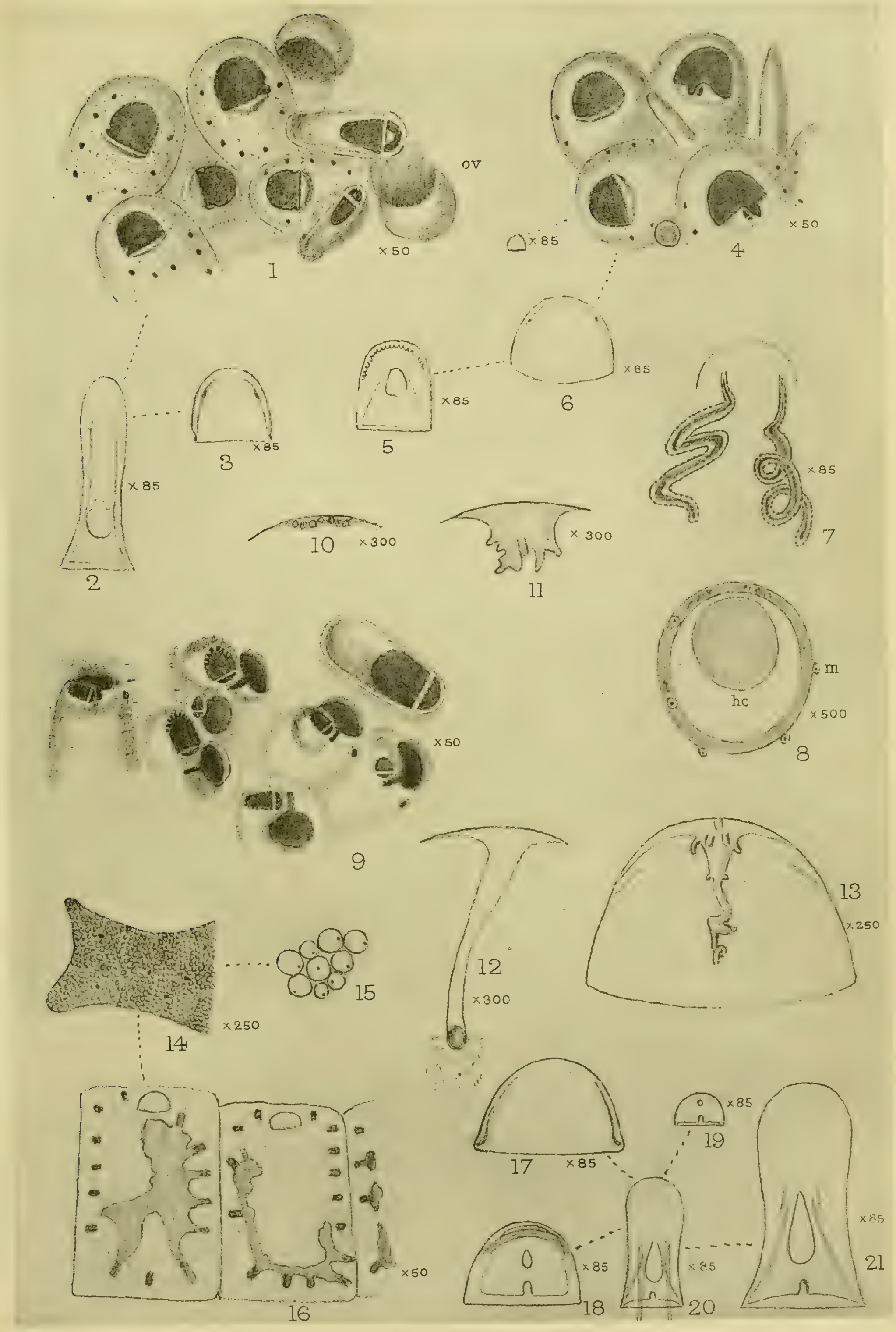

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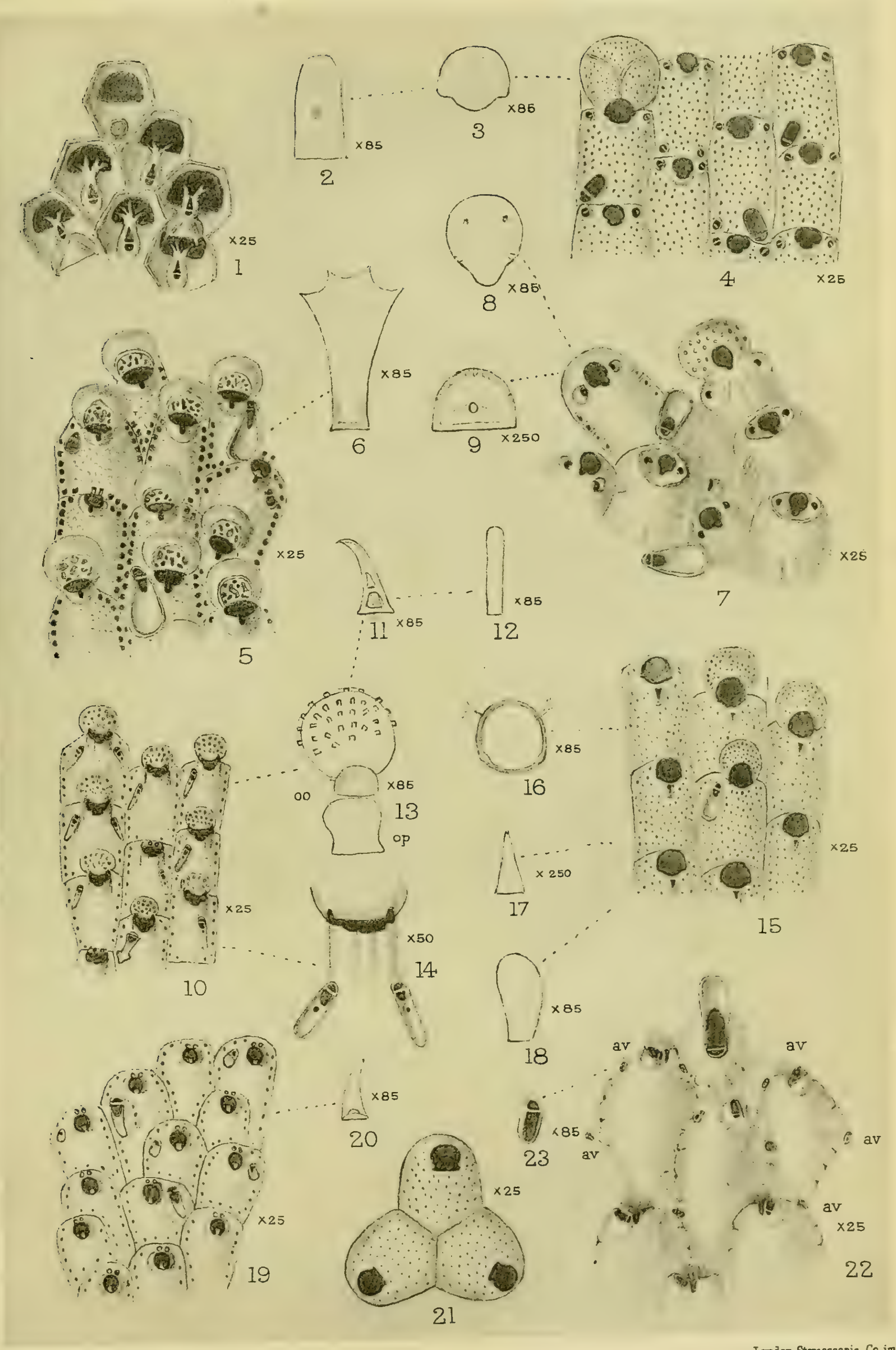

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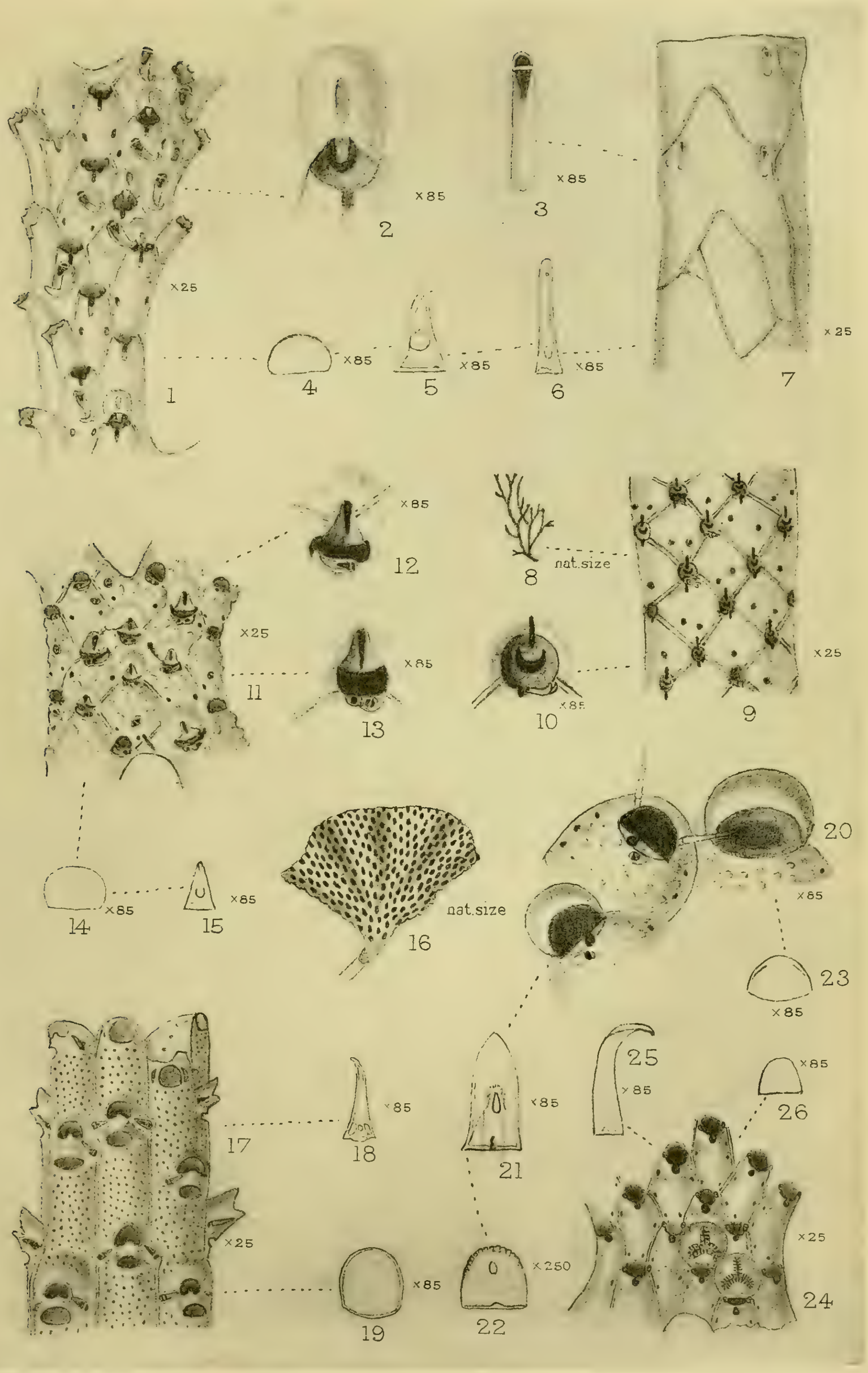

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CHEILOSTOMATA FROM THE RED SEA.

Figs. 11, 12. *Smittia tropica*, sp. nov. Mandibles, × 85.
Fig. 13. Do. do. Decalcified, showing the operculum of the ovicell (*oo*) and the oral operculum (*op*), × 85.
14. Do. do. Peristome and proximal end of the ovicell. The ridges in the peristome are seen distinctly in the semitransparent walls. × 85.
15. *Lepralia Montferrandi*, Sav. & Aud., × 25. From Ras el Millan.
16. Do. do. Operculum, × 85.
Figs. 17, 18. Do. do. Mandibles, × 250 & 85.
Fig. 19. *Smittia nitida*, Verrill, × 25. From Ras el Millan.
20. Do. do. Mandible, × 85.
21. *Lepralia* sp. Primary zoœcia, × 25.
22. *Holoporella pigmentaria*, sp. nov., × 25. From Ras el Millan. *av*, avicularia.
23. Do. do. Minute avicularium, × 85.

Plate 18.

Fig. 1. ***Retepora** abyssinica*, sp. nov., × 25. From Lat. 16° N., long. 41° W.
2. Do. do. Aperture, × 85.
3. Do. do. Dorsal avicularium, × 85.
4. Do. do. Operculum, × 85.
5. Do. do. Anterior mandible, × 85.
6. Do. do. Dorsal mandible, × 85.
7. Do. do. Dorsal surface, × 25.
8. Do. do. Natural size.
9. Do. do. From older part of a colony, × 25.
10. Do. do. Aperture from older part, × 85.
11. *Retepora jermanensis*, sp. nov., × 25. From Um el Jerman.
Figs. 12, 13. Do. do. Aperture, × 85.
Fig. 14. Do. do. Operculum, × 85.
15. Do. do. Mandible, × 85.
16. Do. do. Natural size.
17. *Gigantopora fenestrata*, Sm., × 25. Three of the zoœcia near the distal end are as yet without any arch, but there is an indication of the formation of the avicularian chambers. From Lat. 16° 45′ N., long. 40° 30′ W.
18. Do. do. Mandible, × 85.
19. Do. do. Operculum, × 85.
20. *Holoporella aperta*, Hincks, × 85. From Ras el Millan.
Figs. 21, 22. Do. do. Mandibles, × 85 & 250.
Fig. 23. Do. do. Operculum, × 85.
24. *Retepora hirsuta*, Busk. Piece prepared with Eau de Javelle, × 25. From Lat. 16° N., long. 41° W.
25. Do. do. Mandible, × 85.
26. Do. do. Operculum, × 85.